Bridgewater Primary School
Calculation Guidelines
(Reviewed Summer 2026)

Introduction

Children are introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to special cases, and learn to interpret and use the signs and symbols involved. Over time children learn how to use models and images, such as empty number lines, to support their mental and informal written methods of calculation. As children's mental methods are strengthened and refined, so too are their informal written methods. These methods become more efficient and succinct and lead to efficient written methods that can be used more generally. By the end of Year 6 children are equipped with mental, written and calculator methods that they understand and can use correctly.

The overall aim is that when children leave Bridgewater they:

- have a secure knowledge of number facts and a good understanding of the four operations;
- are able to use this knowledge and understanding to carry out calculations mentally and to apply general strategies when using one-digit and two-digit numbers and particular strategies to special cases involving bigger numbers;
- make use of diagrams and informal notes to help record steps and part-answers when using mental methods that generate more information than can be kept in their heads;
- have an efficient, reliable, compact written method of calculation for each operation that children can apply with confidence when undertaking calculations that they cannot carry out mentally;
- use a calculator effectively, using their mental skills to monitor the process, check the steps involved and decide if the numbers displayed make sense.

When faced with a calculation, children are able to decide which method is most appropriate and have strategies to check its accuracy. At whatever stage in their learning, and whatever method is being used, it must still be underpinned by a secure and appropriate knowledge of number facts, along with those mental skills that are needed to carry out the process and judge if it was successful.

THE FOLLOWING ARE STANDARDS THAT WE EXPECT THE MAJORITY OF CHILDREN TO ACHIEVE

Addition

Y1

Rapid Recall of

- all pairs of number bonds within 20;
- all pairs of numbers with a total of 10, eg 3 + 7;
- addition doubles of all numbers to at least 10, eg 4 + 4.

Mental strategies

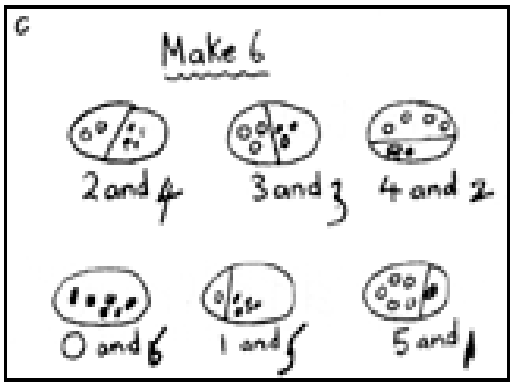
- count on in ones;
- reorder numbers in a calculation;
- begin to bridge through 10, and later 20, when adding a single-digit number;
- use known number facts and place value to add pairs of single-digit numbers;
- add 9 to single-digit numbers by adding 10 then subtracting 1;
- identify near doubles, using doubles already known;
- use patterns of similar calculations.

Mental Calculations

- add a single-digit to a single-digit, without crossing 10, eg 4 + 5;
- add a single-digit to 10;
- add a single-digit to a 'teens' number, without crossing 20 or 10, eg 13 + 5;
- doubles of all numbers to 10, eg 8 + 8, double 6.

Written Step 1 (YR and Y1)

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc.

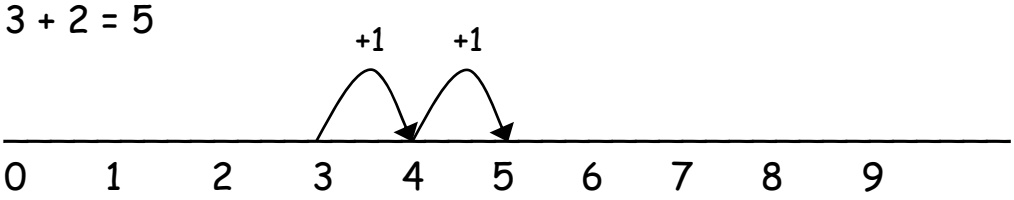


Remember! Children need to move on to being able to count on from one of the numbers.

They use number lines and tracks as well as other practical resources to support calculation and teachers *demonstrate* the use of the number line.

Teachers *demonstrate:*

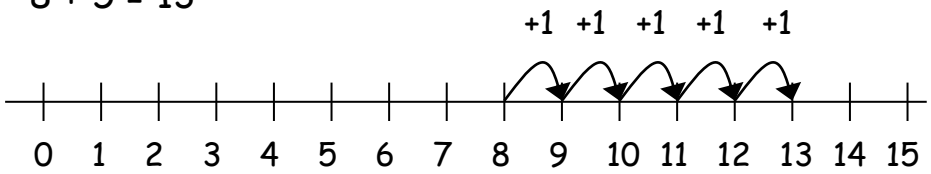
3 + 2 = 5



Children then begin to use numbered lines to support their own calculations using a numbered line to count on in jumps of one.

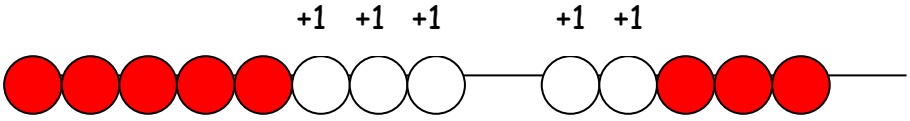
e.g. Child's recording

8 + 5 = 13



Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3 (Use ITP – Interactive Teaching Programs).

8 + 5 = 13



Year 2

Rapid Recall of

- addition facts for all numbers to at least 20 fluently;
- all pairs of numbers with a total of 20, eg 13 + 7;
- all pairs of multiples of 10 with a total of 100, eg 30 + 70;

Mental strategies

- count on in tens or ones;
- reorder numbers in a calculation;
- add three small numbers by putting the largest number first and/or find a pair totaling 10;
- partition additions into tens and units then recombine;
- bridge through 10 or 20;
- use known number facts and place value to add pairs of numbers;
- partition into '5 and a bit' when adding 6, 7, 8 or 9, then recombine;
- add 9, 19, 11 or 21 by rounding and compensating;
- identify near doubles;

- use patterns of similar calculations;
- use the relationship between addition and subtraction;
- derive and use related facts to 100

Mental Calculations

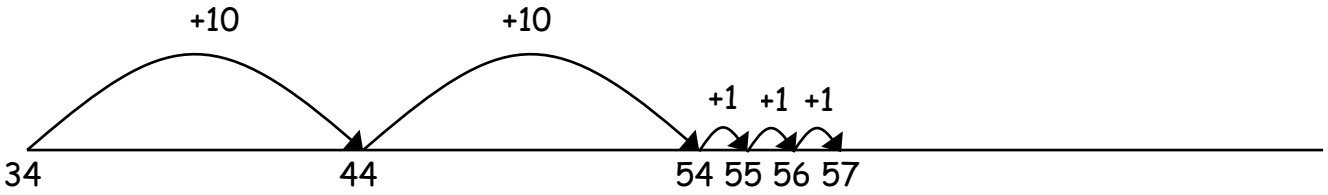
- add a single-digit to a single-digit, without crossing 10, e.g. 4 + 5;
- add a single-digit to 10;
- add a single-digit to a 'teens' number, without crossing 20 or 10, eg 13 + 5;
- doubles of all numbers to 10, eg 8 + 8, double 6, then teen numbers.

Written (Y2)

Children will continue to use concrete objects including structured apparatus such as Dienes and /or cubes in blocks of ten and pictorial representations.
Children will progress to use '**empty number lines**' themselves starting with the larger number and counting on.

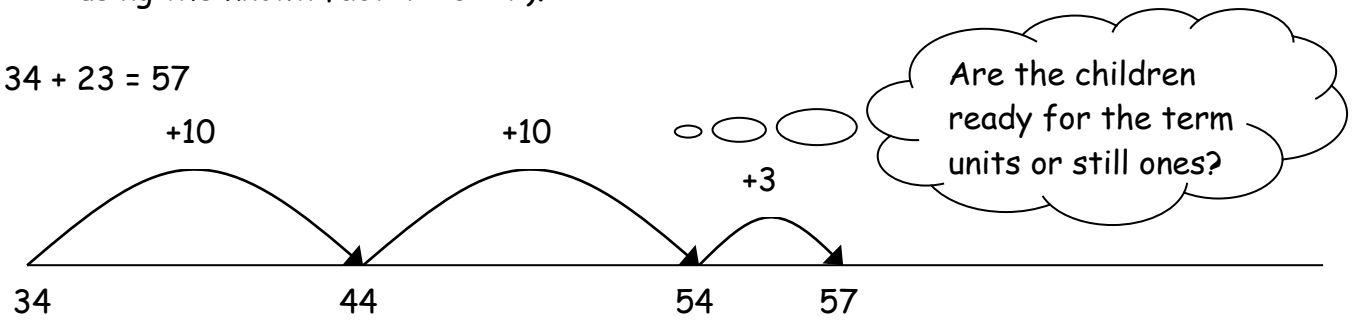
✓ First counting on in tens and ones (units).

34 + 23 = 57



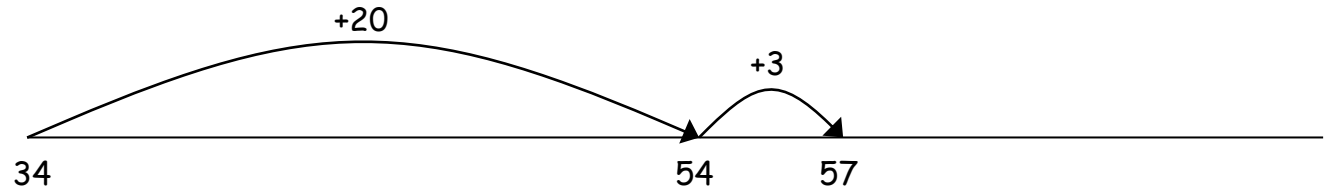
✓ Then helping children to become more efficient by adding the units in one jump (by using the known fact 4 + 3 = 7).

34 + 23 = 57



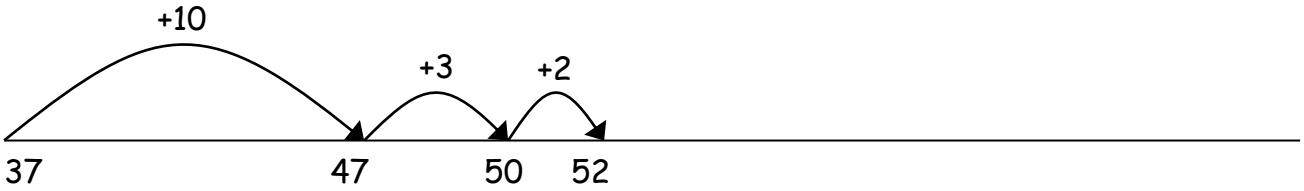
✓ Followed by adding the tens in one jump and the units in one jump.

34 + 23 = 57

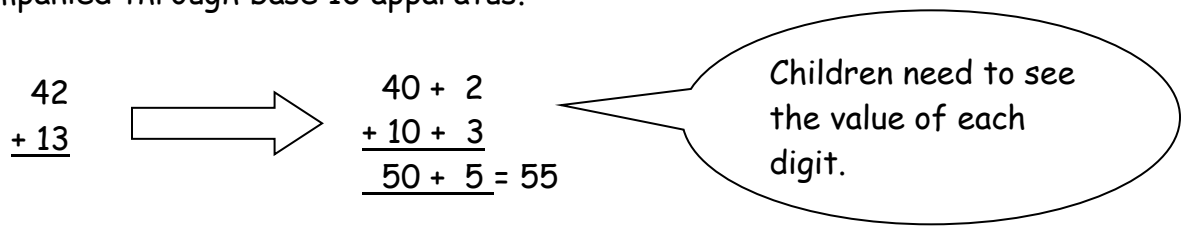


✓ Bridging through ten can help children become more efficient.

37 + 15 = 52



Some children may progress to columnar recording of addition which would be initially accompanied through base 10 apparatus.



Year 3

Rapid Recall of

– addition facts for all numbers to 100;
– all pairs of multiples of 100 with a total of 1000;
– all pairs of multiples of 5 with a total of 100;

Mental strategies

– count on in tens or ones;
– reorder numbers in a calculation;
– add three or four small numbers by putting the largest number first and/or by finding pairs totalling 9, 10 or 11;
– partition into tens and units then recombine;
– bridge through a multiple of 10, then adjust;
– use knowledge of number facts and place value to add pairs of numbers;

– partition into '5 and a bit' when adding 6, 7, 8 or 9;
– add mentally a 'near multiple of 10' to a two-digit number;
– identify near doubles;
– use patterns of similar calculations.

Mental Calculations

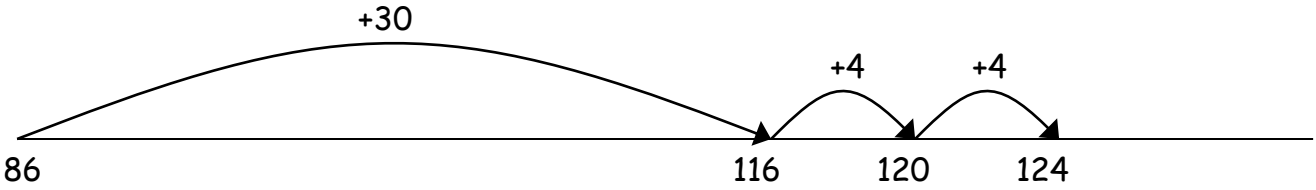
– find what must be added to any multiple of 100 to make 1000, eg 300 + ? = 1000;
– add any pair of two-digit numbers, without crossing a tens boundary or 100, eg 33 + 45;
– add any single-digit to any two-digit number, including crossing the tens boundary, eg 67 + 5;
– find what must be added to any two-digit number to make the next higher/lower multiple of 10, eg 64 + ? = 70;
– find what must be added to any three-digit number to make the next higher/lower multiple of 10, eg 647 + ? = 650;
- add 3-digit numbers and ones (units);
- add 3-digit numbers and tens;
- add 3-digit numbers and hundreds.

Step 3 (Y3) Written

Children will continue to use empty number lines with increasingly large numbers, including compensation where appropriate and, as they are ready, move towards columnar recording.

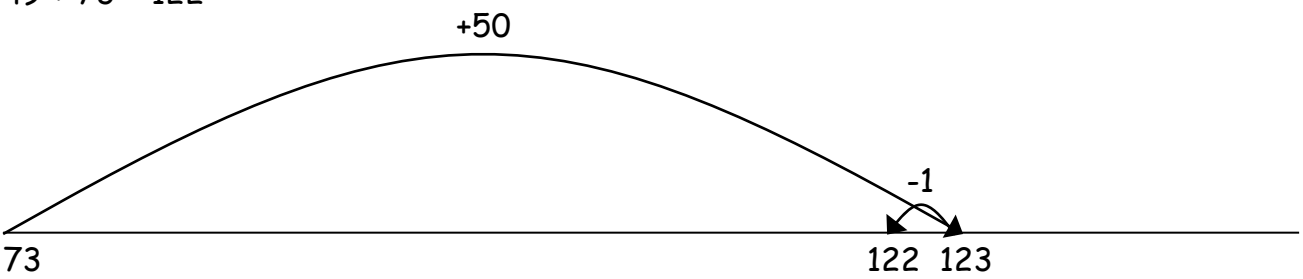
✓ Count on from the largest number irrespective of the order of the calculation.

38 + 86 = 124



✓ Rounding and adjusting

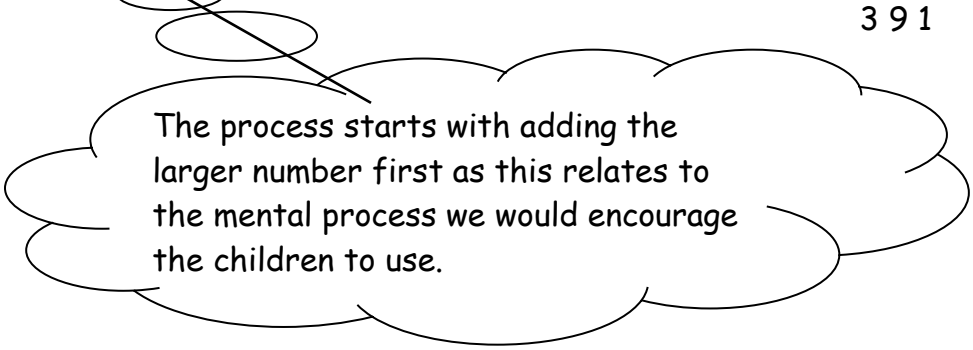
49 + 73 = 122



Children will begin to use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies.

At Bridgewater we will model adding the most significant digits first and then quickly move to adding the least significant digits first in preparation for 'carrying'.

6 7			6 7			2 6 7		
+ 2 4			+ 2 4			+ 1 2 4		
80	(60 +20)		1 1	(7 +4)		1 1	(7 + 4)	
1 1	(7 +4)		80	(60 +20)		8 0	(60 +20)	
9 1			9 1			3 0 0	(200 + 100)	
						3 9 1		



Year 4
Rapid Recall of

Mental strategies
- count on in repeated steps of 1, 10 and 100;
- count up through the next multiple of 10, 100 or 1000;
- reorder numbers in a calculation;
- add 3 or 4 small numbers, finding pairs totalling 10;
- add three two-digit multiples of 10;
- partition into tens and units, adding the tens first;
- bridge through 100;
- use knowledge of number facts and place value to add any pair of two-digit numbers;
- add 9, 19, 29, 11, 21 or 31 by rounding and compensating;
- add the nearest multiple of 10 then adjust;
- continue to use the relationship between addition and subtraction.

Mental Calculations
- find what must be added to any two-digit number to make 100, eg 37 + ? = 100;
- add any pair of two-digit numbers, eg 38 + 85;
- find out what must be added to any two- or three-digit number to make the next higher/lower multiple of 100, eg 374 + ? = 400.

Y4 Written

From this, children will begin to carry below the line with up to four digits.

```
  625        783        367    6534
+  48     +  42     +  85   +2376
 ---        ---        ---    ----
  673        825        452    8910
   1          1         11     11
```

Using similar methods, children will:

- ✓ *add several numbers with different numbers of digits;*
- ✓ *begin to add two or more three-digit sums of money, with or without adjustment from the pence to the pounds;*
- ✓ *know that the decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. £3.59 + 78p.*

Year 5
Rapid Recall of

Mental strategies

– count up through the next multiple of 10, 100 or 1000;
– reorder numbers in a calculation;
– partition into hundreds, tens and units, adding the most significant digit first;
– use known number facts and place value to add pairs of three-digit multiples of 10 and two-digit numbers with one decimal place;
– add the nearest multiple of 10 or 100 then adjust;
– identify near doubles;
– add several numbers;
– develop further the relationship between addition and subtraction.

Mental Calculations

– add any pair of three-digit multiples of 10, eg 570 + 250;
– find what must be added to a decimal fraction with units and tenths to make the next higher whole number, eg. 4.3 + ? = 5;
– add any pair of decimal fractions each with units and tenths, or each with tenths and hundredths, eg 5.7 + 2.5;
- add mentally numbers with more than four digits.

Step 5 Written (Y5)

Children should extend the carrying method to numbers with more than four digits.

```
  5 8 7
+ 4 7 5
  1 0 6 2
    1   1
```

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

Using similar methods, children will:

- ✓ *add several numbers with different numbers of digits;*
- ✓ *begin to add two or more decimal fractions with up to three digits and the same number of decimal places;*
- ✓ *know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 3.2 m – 280 cm.*

Year 6
Rapid Recall of

Mental strategies

– consolidate all strategies from previous years;
– use knowledge of number facts and place value to add three-digit multiples of 10 and two-digit numbers with one decimal place;
– add the nearest multiple of 10, 100 or 1000, then adjust;
– continue to use the relationship between addition and subtraction.

Mental Calculations

Step 6 Written (Y6)

Children should extend the carrying method to a number with any number of digits working with larger numbers.

```
  7 6 4 8
+ 1 4 8 6
  9 1 3 4
  1 1 1
```

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

```
      4 2
  6 4 3 2
    7 8 6
        3
+ 4 6 8 1
 1 1 9 4 4
 1 1 2  1
```

Using similar methods, children will:

- ✓ *add several numbers with different numbers of digits;*
- ✓ *begin to add two or more decimal fractions with up to four digits and either one or two decimal places;*
- ✓ *know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 401.2 + 26.85 + 0.71.*

+ - + - + - + - + - + - +

Subtraction

Y1

Rapid Recall of

-subtraction facts for all numbers to at least 10 then 20.

Mental strategies

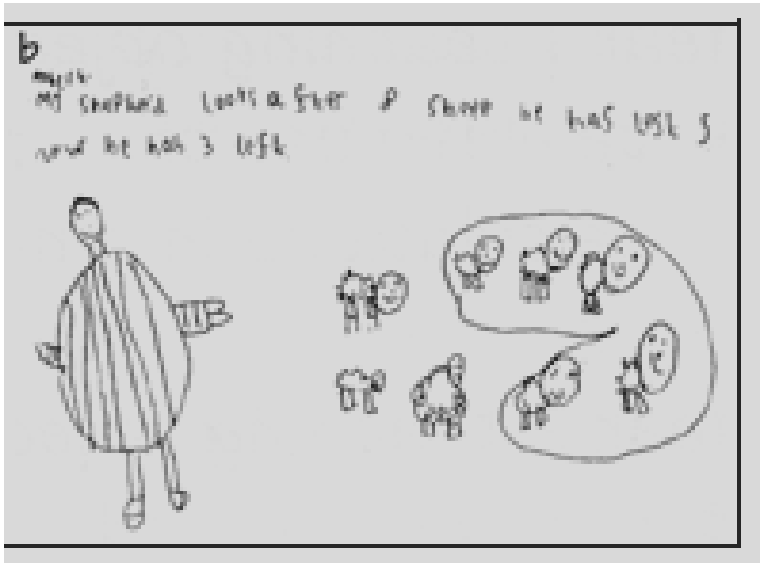
- count back in ones;
- reorder numbers in a calculation;
- use known number facts and place value to subtract pairs of single-digit numbers;
- use patterns of similar calculations.

Mental Calculations

-subtract a single digit from a single digit, without crossing 10, eg 8 – 3;
-subtract a single digit from 10;
-subtract a single digit from a 'teens' number, without crossing 20 or 10, eg, 17 – 3.

Written YR and Y1

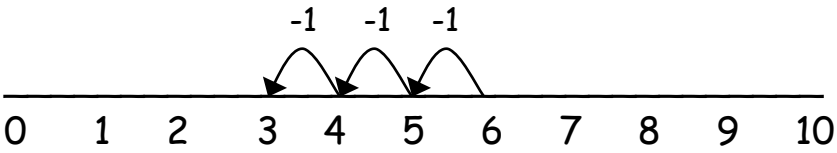
Children are encouraged to develop a mental picture of the number system in their heads to use for calculation and they are supported in this by the teacher using a variety of models and images. They develop ways of recording calculations using pictures etc.



They use number lines and practical resources to support calculation. Teachers *demonstrate* the use of the number line.

Teachers demonstrate:

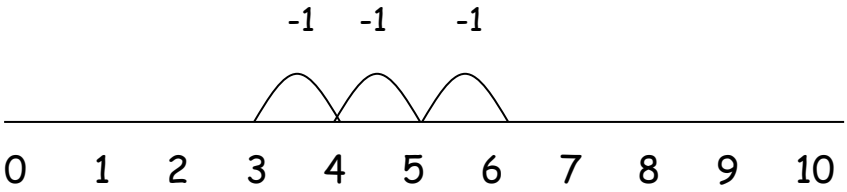
6 – 3 = 3



The number line should also be used to show that 6 - 3 means the 'difference between 6 and 3' or 'the difference between 3 and 6' and how many jumps they are apart.

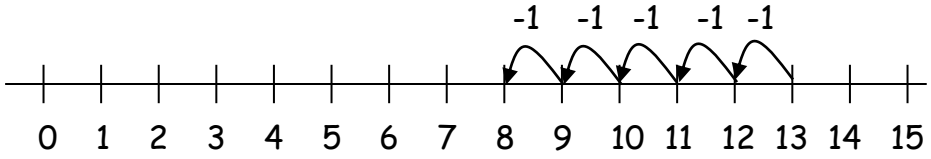
e.g. Child's recording

6 – 3 = 3



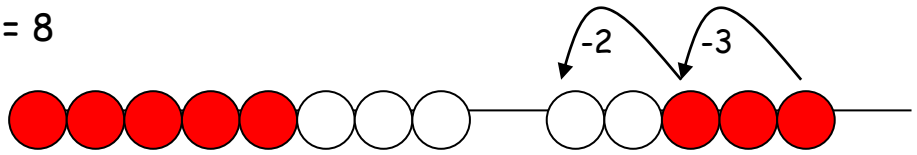
Children then begin to use numbered lines to support their own calculations–using a numbered line to count back in ones (units).

13 – 5 = 8



Bead strings or bead bars can be used to illustrate subtraction including bridging through ten by counting back 3 then counting back 2.

13 – 5 = 8



Year 2

Rapid Recall of

- subtraction facts for all numbers to at least 20 and derive related facts up to 100.

Mental strategies

- count back in tens or ones;
- find a small difference by counting up from the smaller to the larger number;
- reorder numbers in a calculation;

– bridge through 10 or 20;
– use known number facts and place value to subtract pairs of numbers;
– subtract 9, 19, 11 or 21 by rounding and compensating;
– use patterns of similar calculations;
– use the relationship between addition and subtraction.

Mental Calculations

–subtract a single digit from a single digit, without crossing 10, eg 8 – 3;
–subtract a single digit from 10;
–subtract a single digit from a 'teens' number, without crossing 20 or 10, eg 17 – 3;
- subtract a single-digit number from a two-digit number;
- subtract a multiple of 10 from a two-digit number;
- subtract a two-digit number from a two-digit number.

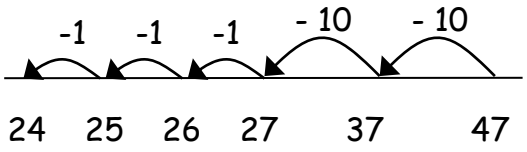
Written Y2

Children will begin to use empty number lines to support calculations. Children can be encouraged to draw their own as appropriate.

Counting back

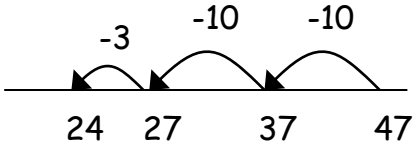
✓ First counting back in tens and ones (units).

47 – 23 = 24



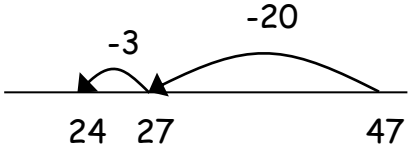
✓ Then helping children to become more efficient by subtracting the units in one jump (by using the known fact 7 – 3 = 4).

47 – 23 = 24



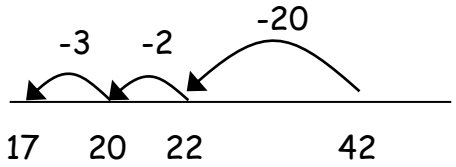
✓ Subtracting the tens in one jump and the units in one jump.

47 – 23 = 24



✓ Bridging through ten can help children become more efficient.

42 – 25 = 17

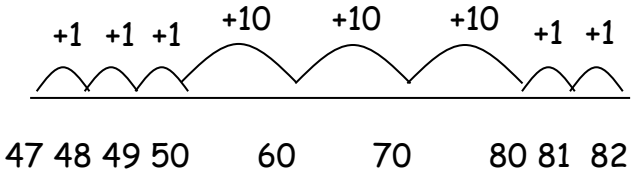


Counting on

If the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, it can be more efficient to count on.

Count up from 47 to 82 in jumps of 10 and jumps of 1.

82 - 47



Help children to become more efficient with counting on by:

- ✓ adding the units in one jump;
- ✓ adding the tens in one jump and the units in one jump;
- ✓ bridging through ten.

Some children may progress to columnar recording of subtraction, which would be initially accompanied through base 10 apparatus.

```
  2 3          20 +  3
- 1 4        - 10 +  4
             ---------
              30 +  7  = 37
```

Children need to see the value of each digit.

Year 3

Rapid Recall of

– subtraction facts for all numbers to 100.

Mental strategies

– count back in tens or ones;
– find a small difference by counting up from the smaller to the larger number;
– partition into tens and units then recombine;
– bridge through a multiple of 10, then adjust;
– use knowledge of number facts and place value to subtract pairs of numbers;
– subtract mentally a 'near multiple of 10' from a two-digit number;
– use patterns of similar calculations;
– say or write a subtraction statement corresponding to a given addition statement.

Mental Calculations

– subtract any pair of two-digit numbers, without crossing a tens boundary or 100, eg 87 – 2;
– subtract any single-digit from any two-digit number, including crossing the tens boundary, eg 82 – 7;
– find what must be subtracted from any two-digit number to make the next higher/lower multiple of 10, eg 56 – ? = 50;
– subtract any three-digit number from any three-digit number when the difference is less than 10, eg 458 – 451, or 603 – 597;
– find what must be subtracted from any three-digit number to make the next higher/lower multiple of 10, eg 246 – ? = 240;
- subtract a single-digit number from a three-digit number;
- subtract a multiple of 10 from a three-digit number;
- subtract a multiple of 100 from a three-digit number.

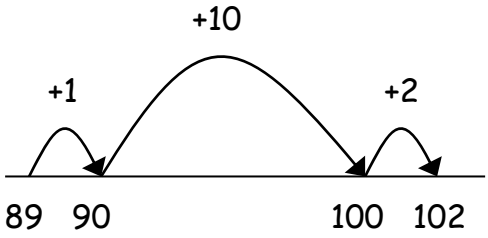
Step 3 Written (Y3)

Children will continue to use empty number lines with increasingly large numbers.

Children will begin to use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies.

Where the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, **counting on** using a number line could be used.

102 – 89 = 13



Partitioning and decomposition

This process could be demonstrated using arrow cards to show the partitioning and base 10 materials to show the decomposition of the number.

	80	+	9	
-	50	+	7	
	30	+	2	

	8	9
-	5	7
	3	2

Initially, the children will be taught using examples that do not need the children to exchange.

From this the children will begin to exchange.

74 – 27 =

	70		4	
-	20		7	

This leads to…

	60		14	
	~~70~~		~~4~~	
-	20		7	
	40	+	7	

	6	14
	~~7~~	~~4~~
-	2	7
	4	7

The calculation should be read as, e.g., 70 subtract

The calculation should be read as, e.g., take 7 from 4.

Children should know that units line up under units, tens under tens, and so on.

Children should become confident with working with numbers with 3 digits.

Year 4
Rapid Recall of

Mental strategies

– count back in repeated steps of 1, 10 and 100;
– reorder numbers in a calculation;
– use knowledge of number facts and place value to subtract any pair of two-digit numbers;
– subtract 9, 19, 29, 11, 21 or 31 by rounding and compensating;
– subtract the nearest multiple of 10 then adjust;
– identify near doubles;
– continue to use the relationship between addition and subtraction.

Mental Calculations

– subtract any pair of two-digit numbers, eg 92 – 47;
– find out what must be subtracted from any two- or three-digit number to make the next higher/lower multiple of 100, eg 826 – ? = 800;
– subtract any four-digit number from any four-digit number when the difference is small, eg 3641 – 3628, 6002 – 5991;

Written Y4

Decomposition

$$\begin{array}{r} {}^{6}\not{7}{}^{14}\not{1}4 \\ -\ 86 \\ \hline 668 \end{array}$$

Children should:

- ✓ *subtract numbers with up to 4 digits using a formal written method;*
- ✓ *be able to subtract numbers with different numbers of digits;*
- ✓ *using this method, children should also begin to find the difference between two three-digit sums of money, with or without 'adjustment' from the pence to the pounds;*
- ✓ *know that decimal points should line up under each other.*

For example:

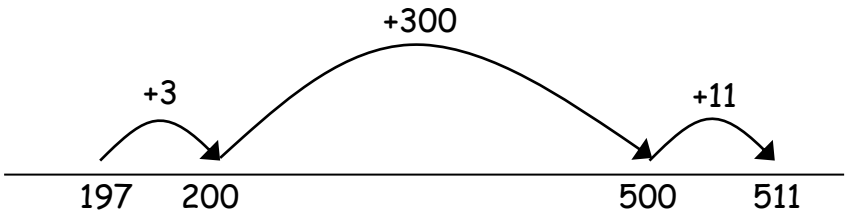
$$\begin{array}{r} {}^{8}\not{£}8.{}^{15}\not{9}5 \\ -\ £4.38 \\ \hline £4.57 \end{array}$$

Alternatively, children can set the amounts to whole numbers, i.e. 895 – 438 and convert to pounds after the calculation.

NB If children have reached the concise stage, they will then continue this method through into years 5 and 6. They will not go back to using the expanded methods.

Where the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, counting on using an empty number line should be used.

511 – 197 = 314



Year 5
Rapid Recall of

Mental strategies

– use known number facts and place value to subtract pairs of three-digit multiples of 10 and two-digit numbers with one decimal place;
– subtract the nearest multiple of 10 or 100 then adjust;
– develop further the relationship between addition and subtraction.

Mental Calculations

– subtract any pair of three-digit multiples of 10, eg 620 – 380;
– subtract any pair of decimal fractions each with units and tenths, or each with tenths and hundredths, eg 0.63 – 0.48;
– subtract a four-digit number just less than a multiple of 1000 from a four-digit number just more than a multiple of 1000, eg 5001 – 1997;
- subtract numbers mentally with more than four digits.

Y5 Written

Decomposition

614 14
~~7~~5~~1~~4
- 286
468

Children should:

- ✓ *be able to subtract numbers with different numbers of digits;*
- ✓ *begin to find the difference between two decimal fractions with up to three digits and the same number of decimal places;*
- ✓ *know that decimal points should line up under each other.*

NB If your children have reached the concise stage they will then continue this method through into year 6. They will not go back to using the expanded methods.

Year 6
Rapid Recall of

Mental strategies

– consolidate all strategies from previous years;
– use knowledge of number facts and place value to subtract pairs of three-digit multiples of 10 and two-digit numbers with one decimal place;
– subtract the nearest multiple of 10, 100 or 1000, then adjust;
– continue to use the relationship between addition and subtraction.

Mental Calculations

Y6 Written

Decomposition

$$\begin{array}{r} {\scriptstyle 5\ 13\ 16} \\ 6\not{4}67 \\ -\ 2684 \\ \hline 3783 \end{array}$$

Children should:

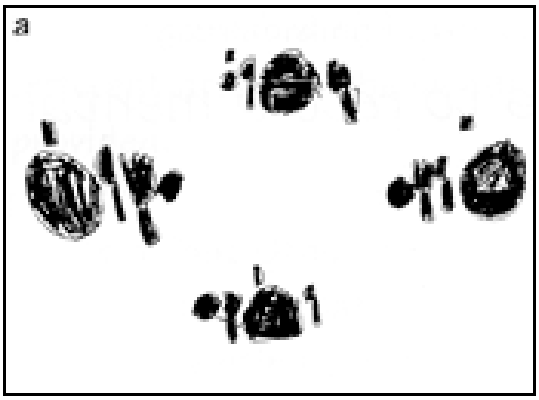
- ✓ *be able to subtract numbers with different numbers of digits;*
- ✓ *be able to subtract two or more decimal fractions with up to three digits and either one or two decimal places;*
- ✓ *know that decimal points should line up under each other.*

+ - + - + - + - + - + - +

Multiplication

YR and Y1

Children will experience equal groups of objects and will count in 2s, 10s and 5s. They will work on practical problem -solving activities involving equal sets or groups.



Children will work with concrete objects, make pictorial representations.
With the support of the teacher the children will use arrays.

Y2

Rapid Recall of

- multiplication facts for the 2, 5 and 10 times-tables;
– doubles of all numbers to ten;
– multiplication facts up to 5 x 5, eg 4 x 3.

Mental strategies

- use knowledge of number facts and place value to multiply by 2, 5 or 10; relate the 5 times table to the divisions on the clock face;
– use doubles and halves and halving as the inverse of doubling.

Mental Calculations

– halve any multiple of 10 up to 100, eg halve 50.

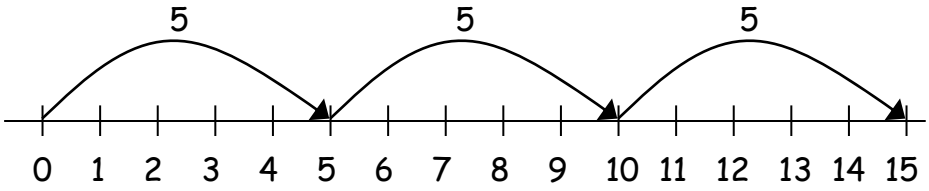
Step 2 (Y2) Written

Children will develop their understanding of multiplication and use jottings to support calculation:

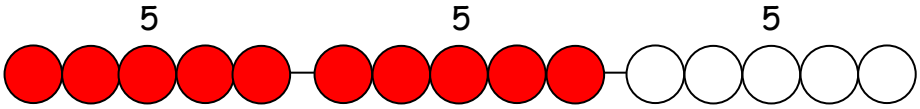
✓ **Repeated addition**

3 times 5 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x 3
Repeated addition can be shown easily on a number line:

5 x 3 = 5 + 5 + 5

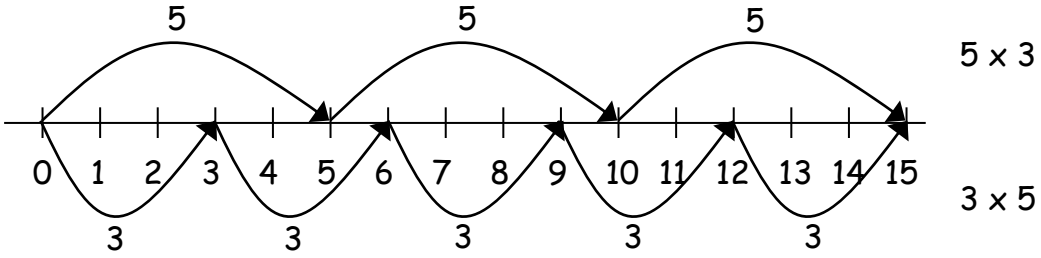


and on a bead bar:
5 x 3 = 5 + 5 + 5



✓ **Commutativity**

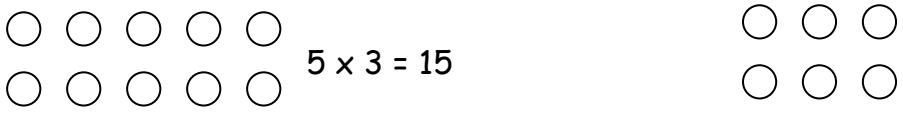
Children should know that 3 x 5 has the same answer as 5 x 3. This can also be shown on the number line.



3 x 5 = 3+3+3+3+3 = 15

✓ **Arrays**

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.



$3 \times 5 = 15$

or

$3 \times 5 = 15$

$5 \times 3 = 15$

Y3

Rapid Recall of

– multiplication facts for the 2, 3, 4, 5, (6), 8 and 10 times-tables.

Mental strategies

- through doubling connect the 2, 4 and 8 times tables;
– to multiply a number by 10 or 100, shift its digits one or two places to the left;
– use knowledge of number facts and place value to multiply or divide by 2, 5, 10, 100;
– use doubling or halving;
– say or write a division statement corresponding to a given multiplication statement.

Mental Calculations

– doubles:
- double any number to at least 20, eg double 18, and corresponding halves, eg halve 36;
- double 60;
- double 35;
- double 450;
– multiply single-digit numbers by 10 or 100, eg 6 x 100;
- multiply a two-digit number by a single-digit number using mental methods, then progressing to formal written methods.

Y3 Written

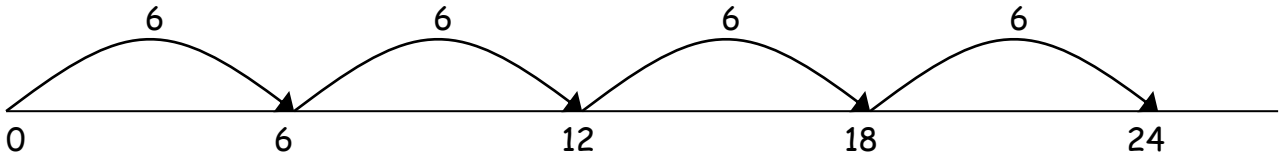
Children will continue to use:

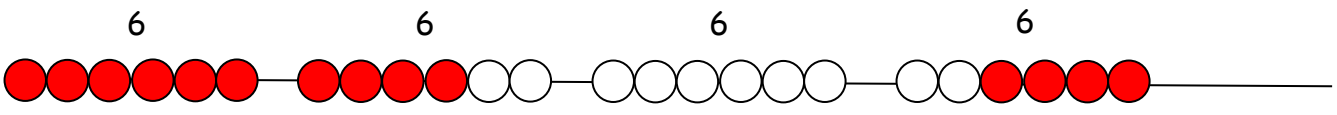
✓ **Repeated addition**

4 times 6 is 6 + 6 + 6 + 6 = 24 or 4 lots of 6 or 6 x 4

Children should use number lines or bead bars to support their understanding.

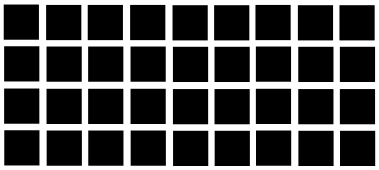
6 x 4





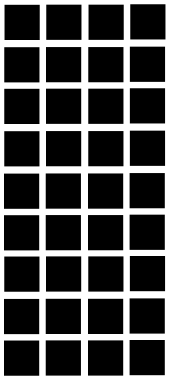
✓ **Arrays**

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.



9 x 4 = 36

4 x 9 = 36



4 x 9 = 36

9 x 4 = 36

✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

□ x 5 = 20 3 x △ = 18 □ x O = 32

✓ **Partitioning**

38 x 5 = (30 x 5) + (8 x 5)
= 150 + 40
= 190

✓ **Grid method**

x	30	8	
5	150	40	= 190

✓ **Formal written method**

If a child is confident with the grid method, they will move on to more formal written methods of multiplication

	3	8	
x		5	
	4	0	(8 x 5)
1	5	0	(30 x 5)
1	9	0	

	3	8	
x		5	
1	9	0	
	4		

Y4

Rapid Recall of

– multiplication facts to 12 x 12.

Mental strategies

– double any two-digit number by doubling tens first;
– use known number facts and place value to multiply, including multiplying by 10 and then 100;
– partition to carry out multiplication;
– use doubling or halving;
– use closely-related facts to carry out multiplication and division;
– use the relationship between multiplication and division.

Mental Calculations

– doubles and halves:
- double any whole number from 1 to 50, eg double 36;
- double any multiple of 10 to 500, eg 380 x 2 :
- double any multiple of 5 to 100, eg 65 x 2;
– multiply any two-digit number by 10, eg 26 x 10;
– multiply any two-digit multiple of 10 by 2, 3, 4 or 5, eg 60 x 4, 80 x 3;
- multiply three numbers together.

Y4-Y6 Written

During years 4, 5 and 6, the main teaching of multiplication will be through use of the grid method. Once children are confident with the grid method, they will then quickly move on to more formal written methods. More able children will access the more formal methods at a quicker rate than their peers.

Grid method TU x U
(Short multiplication: multiplication by a single digit)

23 x 8

Children will approximate first.
23 x 8 is approximately 25 x 8 = 200

Remember to use the grid method with confidence

x	20	3	
8	160	24	= 184

Grid method HTU x U
(Short multiplication: multiplication by a single digit)

346 x 9

Children will approximate first
346 x 9 is approximately 350 x 10 = 3500

x	300	40	6	
9	2700	360	54	= 3114

TU x TU
(Long multiplication: multiplication by more than a single digit)

72 x 38

Children will approximate first
72 x 38 is approximately 70 x 40 = 2800

x	70	2	
30	2100	60	= 2 160
8	560	16	= 576
			2 736
			1

Using similar methods, they may be able to multiply decimals with one decimal place by a single-digit number, approximating first. They should know that the decimal points line up under each other.

e.g. 4.9 x 3

Children will approximate first
4.9 x 3 is approximately 5 x 3 = 15

x	4	0.9	
3	12	2.7	= 14.7

Once the children are confident with the grid method, they can move on to expanded and more compact methods for multiplication of TU x U, HTU x U, TU x TU.

In year 4 children will begin to show a formal method of recording money.
More formal methods are introduced as the children are ready.

This would then move onto a long multiplication layout:

```
  23
X  8
 24
160
184
```

This part should be mentally added.

This then moves onto a one-step approach:

```
  23
X  8
 184
  2
```

Children need reminding here that they are working out 20 x 8, not 2 x 8.

```
 346
x  9
 54
360
2 700
3 1 14
1 1
```

→

```
 346
x  9
3114
4 5
```

For these types of calculation (TU x TU or HTU x TU), children should stick to an expanded method until extremely confident.

```
  72
X 38
  16
 560
  60
2 100
2736
 1
```

```
      5   1   ?
          7   2
x         3   8
-------------------
      5   7   6
  2   1   6   0
-------------------
  2   7   3   6
      1
```

Y5

Rapid Recall of

– multiplication facts to 12 x 12;
- recall prime numbers up to 19;
- identify squared and cubed numbers.

Mental strategies

– use factors and find all factor pairs of a number;
- find common factors of two numbers;
– partition to carry out multiplication;
– use doubling;
– use closely-related facts to carry out multiplication and division;
– use the relationship between multiplication and division;
– use knowledge of number facts and place value to multiply.

Mental Calculations

– multiply any two- or three-digit number by 10 or 100, eg 79 x 100, 363 x 100;
– multiply any two-digit multiple of 10 by a single-digit, eg 60 x 7, 90 x 6;
– double any whole number from 1 to 100, multiples of 10 to 1000;

Y6

Rapid Recall of

– squares of all integers from 1 to 12.

Mental strategies

– use factors;
– partition to carry out multiplication;
– use doubling;
– use closely-related facts to carry out multiplication and division;
– use the relationship between multiplication and division;
– use knowledge of number facts and place value to multiply or divide.

Mental Calculations

– multiply any two-digit number by a single-digit, eg 34 x 6;
– multiply any two-digit number by 50 or 25, eg 23 x 50, 47 x 25;
– multiply any whole number by 10 or 100;
– find squares of multiples of 10 to 100;
– find any multiple of 10% of a whole number or quantity, eg 70% of £20, 50% of 5kg, 20% of 2 metres.

Y6 Written

In Year 6 no new methods will be taught, although extensions for difficulty should be taught, e.g. ThHTU x U, HTU x TU, U.th x U and ThHTU x TU.

These will be taught using the same methods as those from Year 4.

Further example

24 × 16 becomes

		2	
		2	4
×		1	6
2	4	0	
1	4	4	
3	8	4	

Answer: 384

124 × 26 becomes

		1	2	
		1	2	4
×			2	6
2	4	8	0	
		7	4	4
3	2	2	4	
	1	1		

Answer: 3224

124 × 26 becomes

		1	2	
		1	2	4
×			2	6
		7	4	4
2	4	8	0	
3	2	2	4	
	1	1		

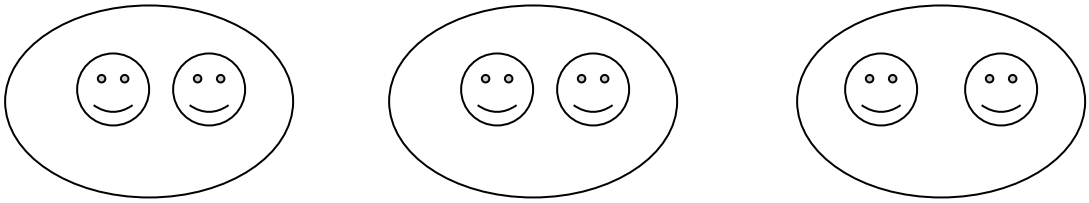
Answer: 3224

+ - + - + - + - + - + - +

Division

YR and Y1

Children will understand equal groups and share items out in play and problem-solving. They will count in 2s and 10s and later in 5s.



Children will work with concrete objects, make pictorial representations.
With the support of the teacher the children will use arrays.
Children will find half of a quantity.

Y2

Rapid Recall of

- multiplication facts for the 2, 5 and 10 times-tables and **corresponding division facts**; relate the 5 times table to the divisions on the clock face;
– doubles of all numbers to ten and the **corresponding halves**.

Mental strategies

- use knowledge of number facts and place value to divide by 2, 5 or 10;
– use doubles and halves and halving as the inverse of doubling.

Mental Calculations

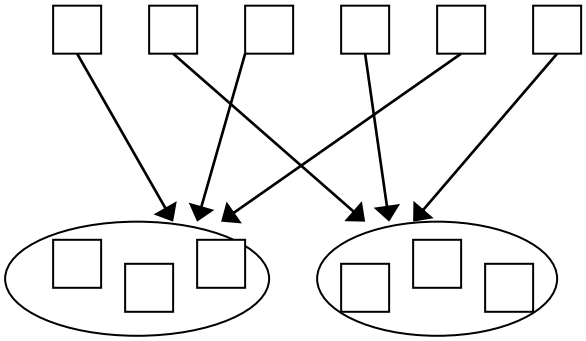
– halve any multiple of 10 up to 100, eg halve 50.

Y2 Written

Children will develop their understanding of division and use jottings to support calculation

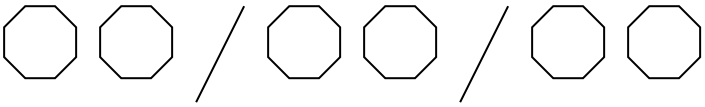
- ✓ **Sharing equally**

6 sweets shared between 2 people; how many do they each get?



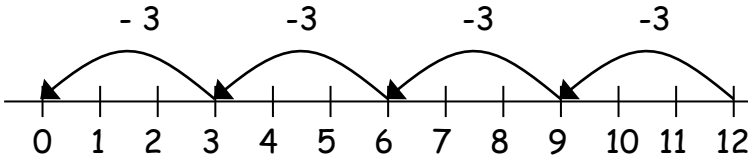
✓ **Grouping or repeated subtraction**

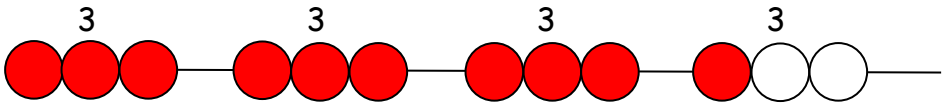
There are 6 sweets, how many people can have 2 sweets each?



✓ **Repeated subtraction using a number line or bead bar (ITP)**

12 ÷ 3 = 4





The bead bar may help children with interpreting division calculations.

✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

□ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4

Children need to be shown that division can't be done in any order, unlike multiplication.

Y3

Rapid Recall of

– multiplication facts for the 2,3,4, 5, 6, 8 and 10 times-tables and **corresponding division facts**.

Mental strategies

– use knowledge of number facts and place value to divide by 2, 5, 10, 100;
– use halving;
– say or write a division statement corresponding to a given multiplication statement.

Mental Calculations

– doubles:
- double any number to at least 20, eg double 18, and corresponding halves, eg halve 36;
- double 60, halve 120;
- double 35, halve 70;
= double 450, halve 900;
– divide any multiple of 10 by 10, eg 60 ÷ 10, and any multiple of 100 by 100, eg 700 ÷ 100.

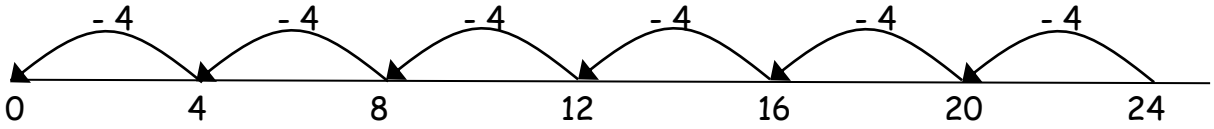
Y3 Written

Ensure that the emphasis in Y3 is on grouping rather than sharing.
Children will continue to use:

- ✓ **Repeated subtraction using a number line**

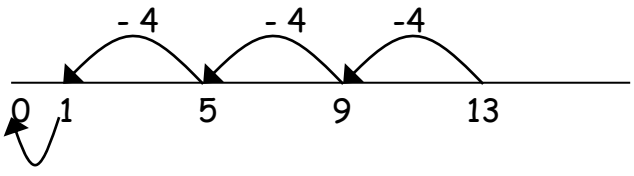
Children will use an empty number line to support their calculation.

24 ÷ 4 = 6



Children should also move onto calculations involving remainders.

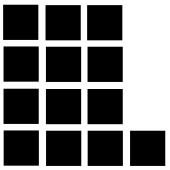
13 ÷ 4 = 3 r 1



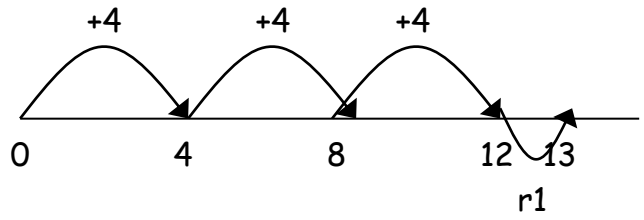
r1

or

13 ÷ 4 = 3 r 1



If children are confident with their tables, they may prefer a method of counting on.



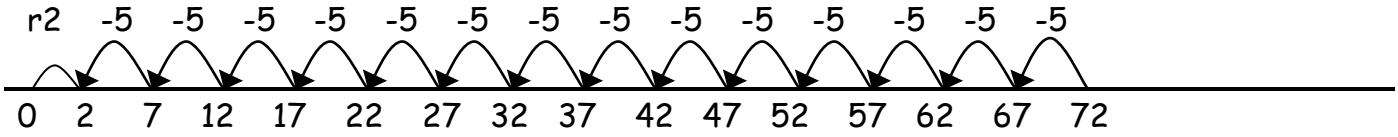
- ✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

26 ÷ 2 = □ 24 ÷ △ = 12 □ ÷ 10 = 8

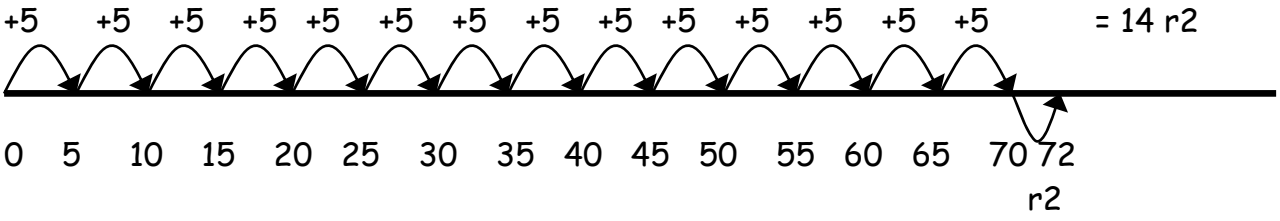
Children will move from mental calculation of two digits divided by a single digit to a more formal method.

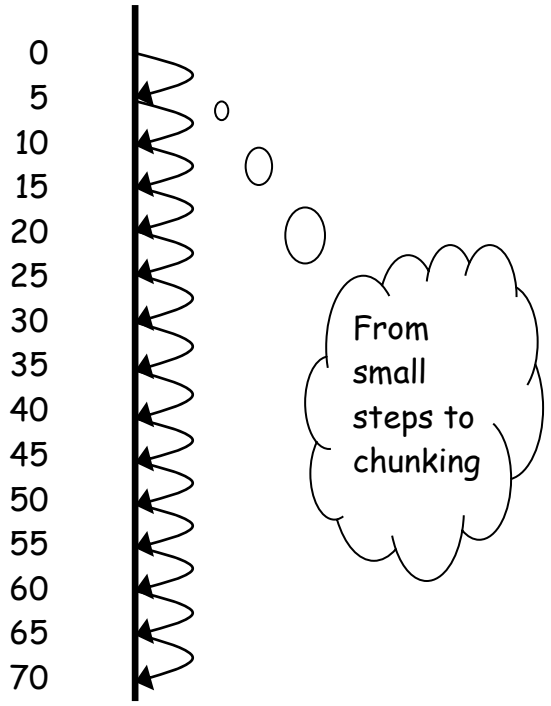
Children will develop their use of repeated subtraction to be able to subtract multiples of the divisor. Initially, these should be multiples of 10s, 5s, 2s and 1s–numbers with which the children are more familiar.

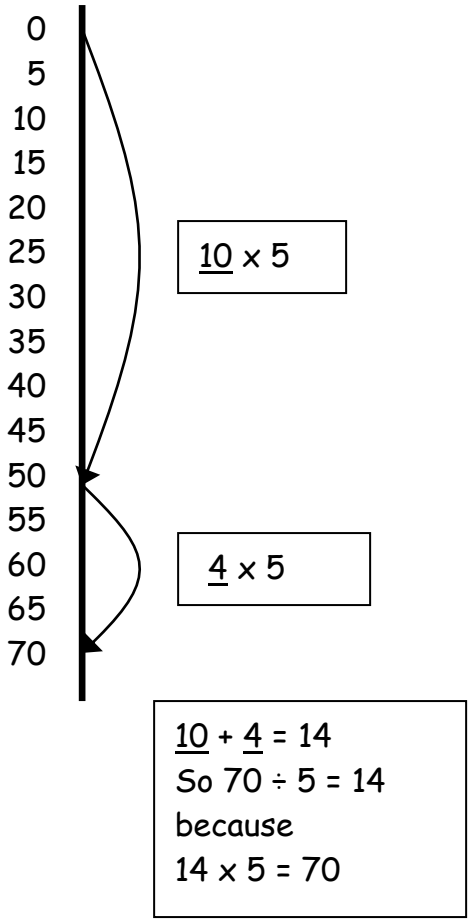
72 ÷ 5 = 14 r2



If children are confident with their tables, they may prefer a method of **counting on**.







Then onto the vertical method:

Chunking

$$
\begin{array}{r}
2\ 4 \\
\hline
3\ )\ 7\ 2 \\
-\ 3\ 0 \quad (3 \times 10) \\
\hline
4\ 2 \\
-\ 3\ 0 \quad (3 \times 10) \\
\hline
1\ 2 \quad (3 \times 4)
\end{array}
$$

Top tip: Children to subtract chunks they are most comfortable with
Work out 2x
5x
10x

Moving on to (only when proficient in all times tables!)

Short division TU ÷ U

72 ÷ 3

$$
\begin{array}{r}
2\ 4 \\
\hline
3\ )\ 7^{1}2
\end{array}
$$

Make sure children understand language of what they are dividing, eg how many 3s are in 70. A link to multiplication would be beneficial here.

Y4

Rapid Recall of

– division facts corresponding to tables up to 12 x 12.

Mental strategies

– use known number facts and place value to divide, including dividing by 10 and then 100;
– use halving;
– use closely-related facts to carry out division;
– use the relationship between multiplication and division;
- understand what happens when you divide by 1.

Mental Calculations

– doubles and halves;
- double any whole number from 1 to 50, eg double 36, and find all the corresponding halves, eg 96 ÷ 2;
- double any multiple of 10 to 500, eg 380 x 2, and find all the corresponding halves, eg 760 ÷ 2, 130 ÷ 2;
– divide a multiple of 100 by 10, eg 600 ÷ 10.

Y4 Written

To try and become fluent in the formal method of short division with exact answers.

Y5

Rapid Recall of

– division facts corresponding to tables up to 12 x 12;
- factors of all numbers.

Mental strategies

– use halving;
– use closely-related facts to carry out multiplication and division;
– use the relationship between multiplication and division;
– use knowledge of number facts and place value to divide.

Mental Calculations

– divide a multiple of 100 by 10 or 100, eg 4000 ÷ 10, 3600 ÷ 100;
– double any whole number from 1 to 100, multiples of 10 to 1000, and find corresponding halves;
– find 50%, 25%, 10% of a small whole numbers or quantities, eg 25% of £8;
- divide whole numbers and those involving decimals by 10, 100 and 1000.

Y5 Written

Using **chunking** children can start to subtract larger multiples of the divisor, e.g. 30x and then move on to use written methods to solve short division ThHTU ÷ U.

Short division HTU ÷ U

196 ÷ 6

$$6\overline{)19^{1}6}\quad 3\ 2\ r\ 4$$

Again, the language is very important here, with the link to multiplication.

Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2.

Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division. For example 240 ÷ 52 is 4 remainder 32, but whether the answer should be rounded up to 5 or rounded down to 4 depends on the context.

Short division ThHTU ÷ U

2453 ÷ 5

$$5\overline{)2^{2}4^{4}5\ 3}\quad 0\ 4\ 8\ 0\ r\ 3 \qquad \text{becomes} \qquad 5\overline{)2^{2}4^{4}5\ 3.0}\quad 0\ 4\ 8\ 0.6$$

Pupils need to express the results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding.

$$98 \div 4 = 98/4 = 24\ r2 = 24\tfrac{1}{2} = 24.5 = 25$$

Y6
Rapid Recall of

Mental strategies

- use halving;
- use closely-related facts to carry out multiplication and division;
- use the relationship between multiplication and division;
- use knowledge of number facts and place value to multiply or divide.

Mental Calculations

– divide any whole number by 10 or 100, giving any remainder as a decimal, eg 47 ÷ 10 = 4.7, 1763 ÷ 100 = 17.63;
– find any multiple of 10% of a whole number or quantity, eg 70% of £20, 50% of 5kg, 20% of 2 metres.

Y6 Written

Children will continue to use written methods to solve short division TU ÷ U and HTU ÷ U.
Long division HTU ÷ TU
972 ÷ 36

```
      27
36 ) 972
   - 720      20x
     252
   - 252       7x
       0
```

Answer : 27

Any **remainders** should be shown **as fractions**, i.e. if the children were dividing 32 by 10, the answer should be shown as $3\ ^{2}/_{10}$ which could then be written as $3\ ^{1}/_{5}$ in its lowest terms.

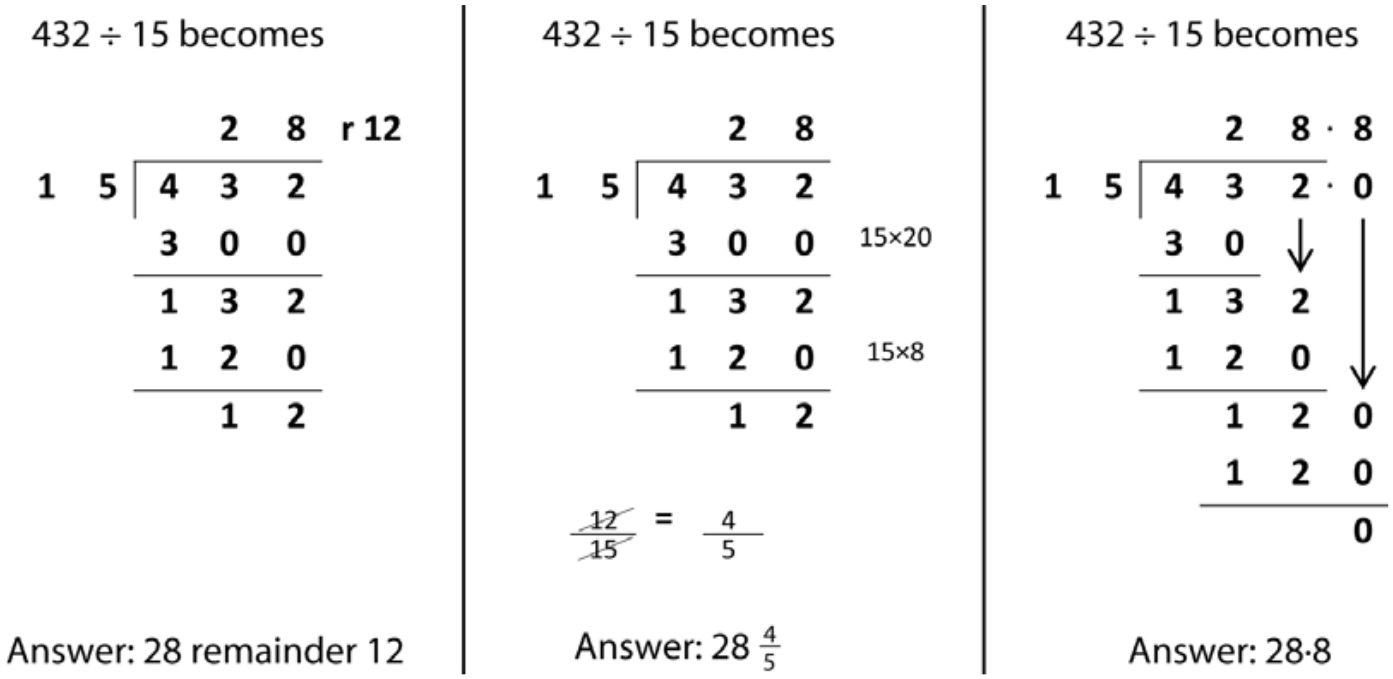
Extend to decimals with up to two decimal places. Children should know that decimal points line up under each other.

87.5 ÷ 7

```
     12.5
7 ) 87.5
  - 70.0      10x
    17.5
  - 14.0       2x
     3.5
  -  3.5     0.5x
     0
```

Answer : 12.5

Further example from Appendix 1



+ - + - + - + - + - + - +

By the end of year 6 children will have a range of calculation methods, both mental and written. Selection will depend upon the numbers involved.
Children should not be made to go onto the next stage if:

1) **they are not ready;**
2) **they are not confident.**

Children should be encouraged to approximate their answers before calculating.
Children should be encouraged to check their answers after calculation using an appropriate strategy.
Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

Appendices attached to support the development of models and images sourced from White Rose Maths.

Year 1 - 6

Calculation Policy
Addition and Subtraction

#MathsEveryoneCan

White Rose Maths

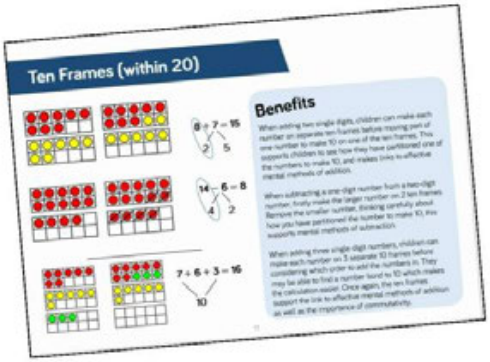
Notes and Guidance

Calculation Policy

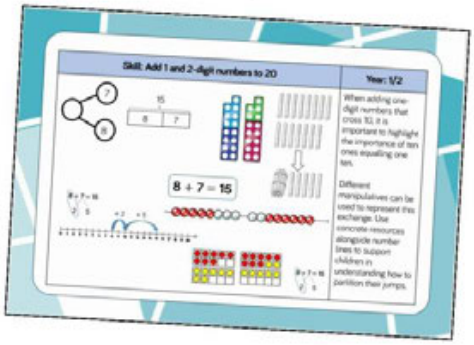
Welcome to the White Rose Maths Calculation Policy.

This document is broken down into addition and subtraction, and multiplication and division.

At the start of each policy, there is an overview of the different models and images that can support the teaching of different concepts. These provide explanations of the benefits of using the models and show the links between different operations.

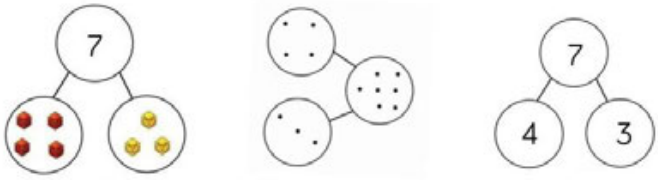


Each operation is then broken down into skills and each skill has a dedicated page showing the different models and images that could be used to effectively teach that concept.



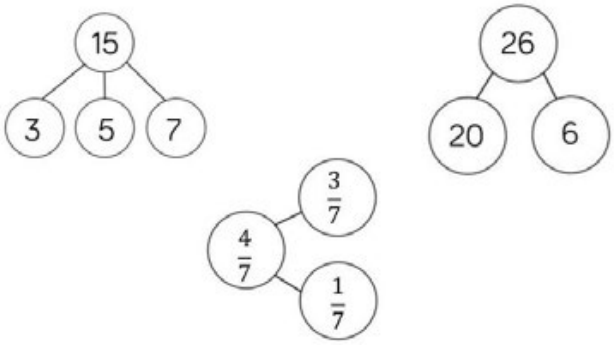
There is an overview of skills linked to year groups to support consistency through out school. A glossary of terms is provided at the end of the calculation policy to support understanding of the key language used to teach the four operations.

Part-Whole Model



$7 = 4 + 3$ $\quad 7 - 3 = 4$

$7 = 3 + 4$ $\quad 7 - 4 = 3$



Benefits

This part-whole model supports children in their understanding of aggregation and partitioning. Due to its shape, it can be referred to as a cherry part-whole model.

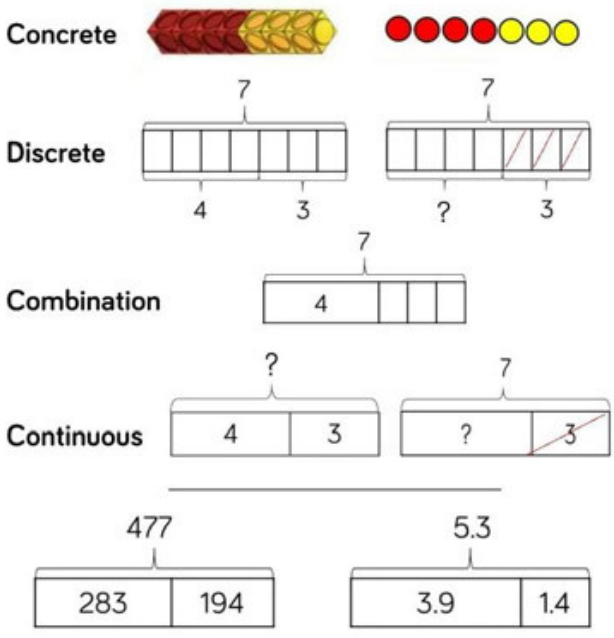
When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.

When the whole is complete and at least one of the parts is empty, children use partitioning (a form of subtraction) to find the missing part.

Part-whole models can be used to partition a number into two or more parts, or to help children to partition a number into tens and ones or other place value columns.

In KS2, children can apply their understanding of the part-whole model to add and subtract fractions, decimals and percentages.

Bar Model (single)



Benefits

The single bar model is another type of a part-whole model that can support children in representing calculations to help them unpick the structure.

Cubes and counters can be used in a line as a concrete representation of the bar model.

Discrete bar models are a good starting point with smaller numbers. Each box represents one whole.

The combination bar model can support children to calculate by counting on from the larger number. It is a good stepping stone towards the continuous bar model.

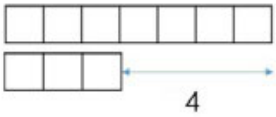
Continuous bar models are useful for a range of values. Each rectangle represents a number. The question mark indicates the value to be found.

In KS2, children can use bar models to represent larger numbers, decimals and fractions.

Bar Model (multiple)

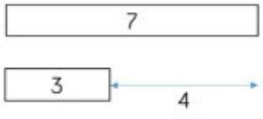
Discrete

$7 + 3 = 10$

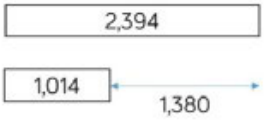


$7 - 3 = 4$

Continuous



$7 - 3 = 4$



$2{,}394 - 1{,}014 = 1{,}380$

Benefits

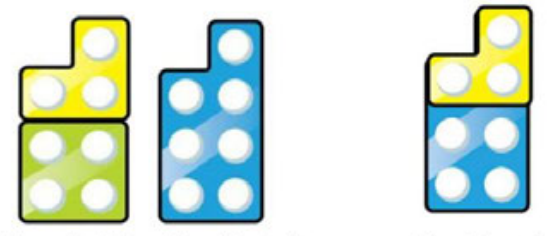
The multiple bar model is a good way to compare quantities whilst still unpicking the structure.

Two or more bars can be drawn, with a bracket labelling the whole positioned on the right hand side of the bars. Smaller numbers can be represented with a discrete bar model whilst continuous bar models are more effective for larger numbers.

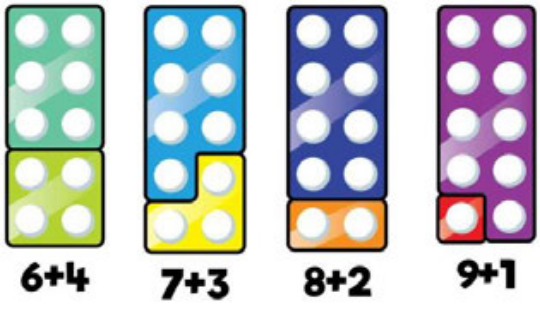
Multiple bar models can also be used to represent the difference in subtraction. An arrow can be used to model the difference.

When working with smaller numbers, children can use cubes and a discrete model to find the difference. This supports children to see how counting on can help when finding the difference.

Number Shapes



$7 = 4 + 3$ $7 = 3 + 4$ $7 - 3 = 4$



Benefits

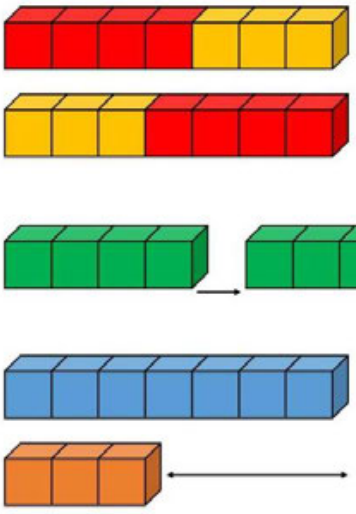
Number shapes can be useful to support children to subitise numbers as well as explore aggregation, partitioning and number bonds.

When adding numbers, children can see how the parts come together making a whole. As children use number shapes more often, they can start to subitise the total due to their familiarity with the shape of each number.

When subtracting numbers, children can start with the whole and then place one of the parts on top of the whole to see what part is missing. Again, children will start to be able to subitise the part that is missing due to their familiarity with the shapes.

Children can also work systematically to find number bonds. As they increase one number by 1, they can see that the other number decreases by 1 to find all the possible number bonds for a number.

Cubes



$7 = 4 + 3$

$7 = 3 + 4$

$7 - 3 = 4$

$7 - 3 = 4$

Benefits

Cubes can be useful to support children with the addition and subtraction of one-digit numbers.

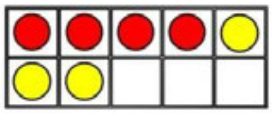
When adding numbers, children can see how the parts come together to make a whole. Children could use two different colours of cubes to represent the numbers before putting them together to create the whole.

When subtracting numbers, children can start with the whole and then remove the number of cubes that they are subtracting in order to find the answer. This model of subtraction is reduction, or take away.

Cubes can also be useful to look at subtraction as difference. Here, both numbers are made and then lined up to find the difference between the numbers.

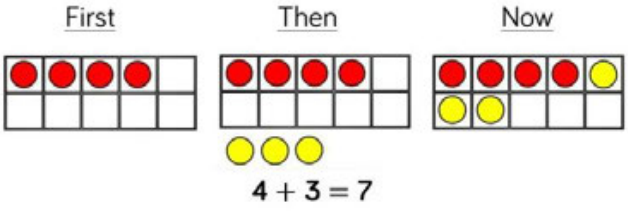
Cubes are useful when working with smaller numbers but are less efficient with larger numbers as they are difficult to subitise and children may miscount them.

Ten Frames (within 10)

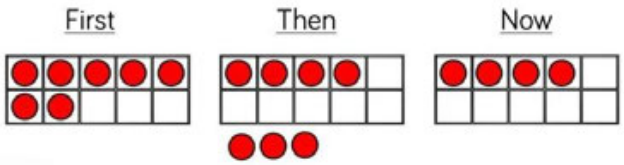


$4 + 3 = 7$
$3 + 4 = 7$
$7 - 3 = 4$
$7 - 4 = 3$

4 is a part.
3 is a part.
7 is the whole.



$4 + 3 = 7$



$7 - 3 = 4$

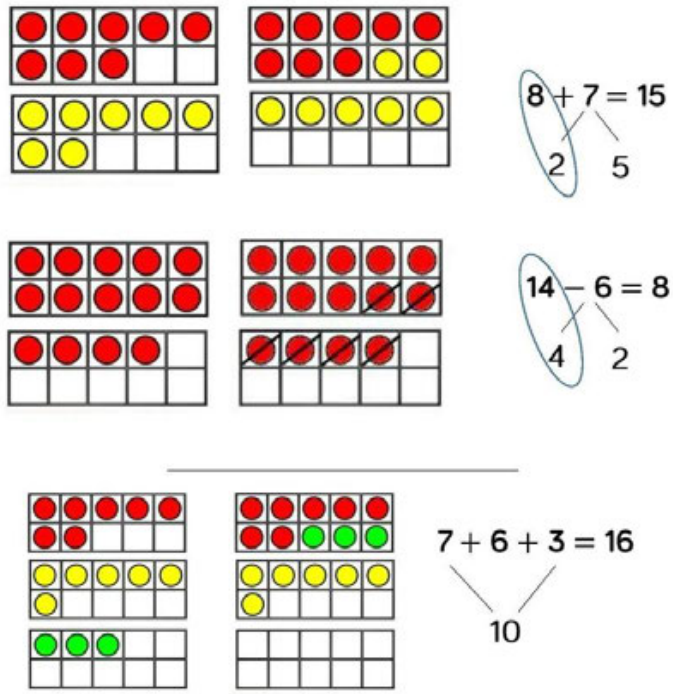
Benefits

When adding and subtracting within 10, the ten frame can support children to understand the different structures of addition and subtraction.

Using the language of parts and wholes represented by objects on the ten frame introduces children to aggregation and partitioning.
Aggregation is a form of addition where parts are combined together to make a whole. Partitioning is a form of subtraction where the whole is split into parts. Using these structures, the ten frame can enable children to find all the number bonds for a number.

Children can also use ten frames to look at augmentation (increasing a number) and take-away (decreasing a number). This can be introduced through a first, then, now structure which shows the change in the number in the 'then' stage. This can be put into a story structure to help children understand the change e.g. First, there were 7 cars. Then, 3 cars left. Now, there are 4 cars.

Ten Frames (within 20)



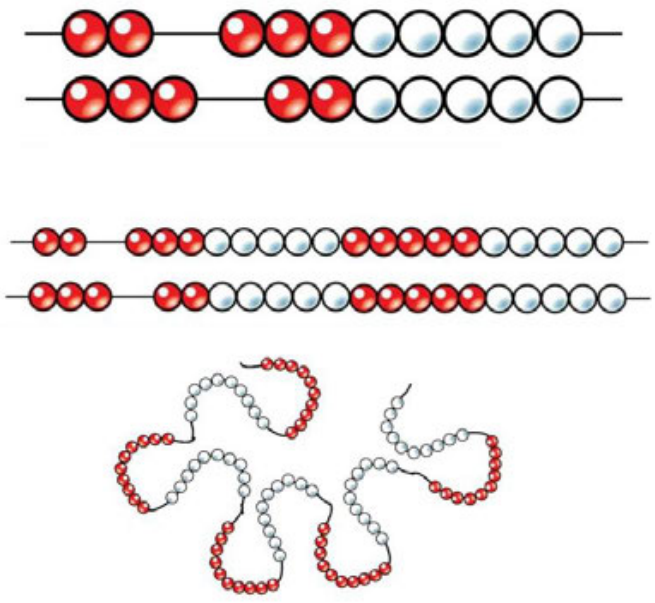
Benefits

When adding two single digits, children can make each number on separate ten frames before moving part of one number to make 10 on one of the ten frames. This supports children to see how they have partitioned one of the numbers to make 10, and makes links to effective mental methods of addition.

When subtracting a one-digit number from a two-digit number, firstly make the larger number on 2 ten frames. Remove the smaller number, thinking carefully about how you have partitioned the number to make 10, this supports mental methods of subtraction.

When adding three single-digit numbers, children can make each number on 3 separate 10 frames before considering which order to add the numbers in. They may be able to find a number bond to 10 which makes the calculation easier. Once again, the ten frames support the link to effective mental methods of addition as well as the importance of commutativity.

Bead Strings



Benefits

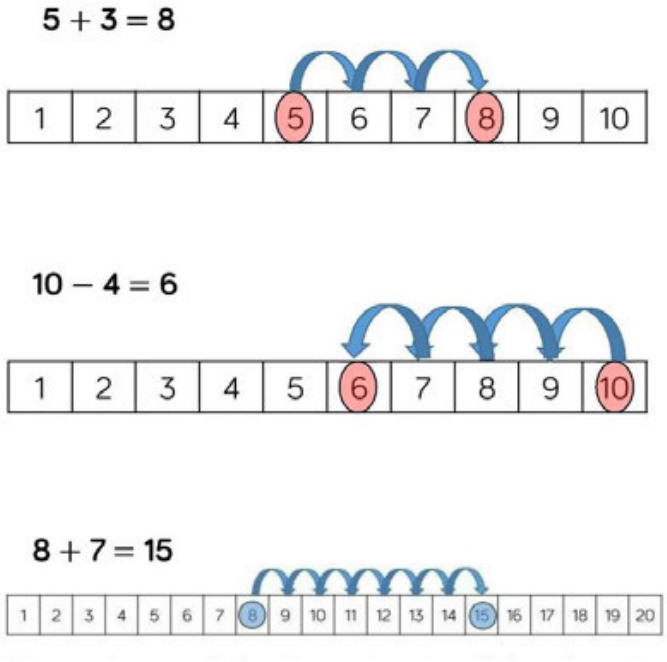
Different sizes of bead strings can support children at different stages of addition and subtraction.

Bead strings to 10 are very effective at helping children to investigate number bonds up to 10.
They can help children to systematically find all the number bonds to 10 by moving one bead at a time to see the different numbers they have partitioned the 10 beads into e.g. 2 + 8 = 10, move one bead, 3 + 7 = 10.

Bead strings to 20 work in a similar way but they also group the beads in fives. Children can apply their knowledge of number bonds to 10 and see the links to number bonds to 20.

Bead strings to 100 are grouped in tens and can support children in number bonds to 100 as well as helping when adding by making ten. Bead strings can show a link to adding to the next 10 on number lines which supports a mental method of addition.

Number Tracks



Benefits

Number tracks are useful to support children in their understanding of augmentation and reduction.

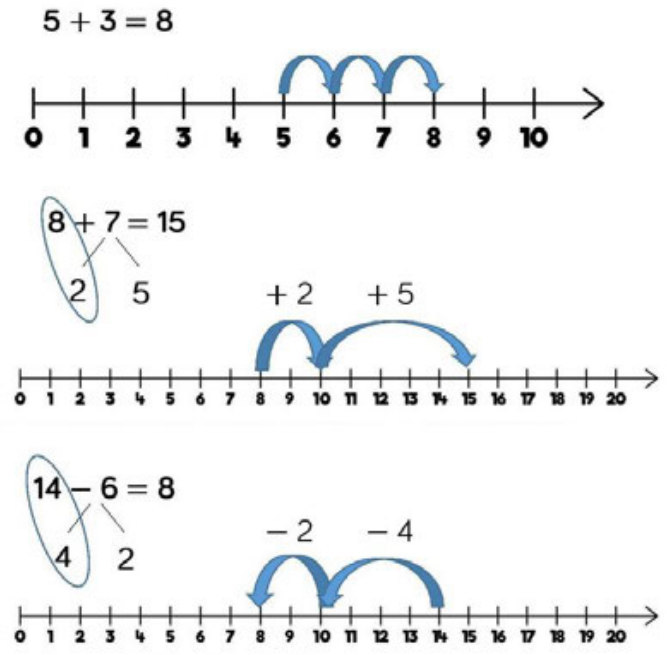
When adding, children count on to find the total of the numbers. On a number track, children can place a counter on the starting number and then count on to find the total.

When subtracting, children count back to find their answer. They start at the minuend and then take away the subtrahend to find the difference between the numbers.

Number tracks can work well alongside ten frames and bead strings which can also model counting on or counting back.

Playing board games can help children to become familiar with the idea of counting on using a number track before they move on to number lines.

Number Lines (labelled)



Benefits

Labelled number lines support children in their understanding of addition and subtraction as augmentation and reduction.

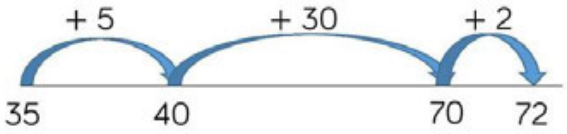
Children can start by counting on or back in ones, up or down the number line. This skill links directly to the use of the number track.

Progressing further, children can add numbers by jumping to the nearest 10 and then jumping to the total. This links to the making 10 method which can also be supported by ten frames. The smaller number is partitioned to support children to make a number bond to 10 and to then add on the remaining part.

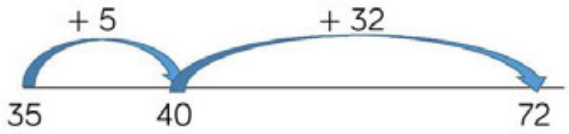
Children can subtract numbers by firstly jumping to the nearest 10. Again, this can be supported by ten frames so children can see how they partition the smaller number into the two separate jumps.

Number Lines (blank)

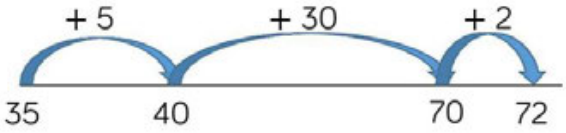
35 + 37 = 72



35 + 37 = 72



72 − 35 = 37



Benefits

Blank number lines provide children with a structure to add and subtract numbers in smaller parts.

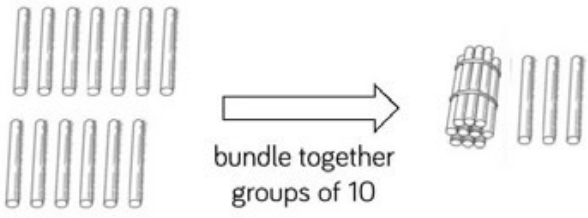
Developing from labelled number lines, children can add by jumping to the nearest 10 and then adding the rest of the number either as a whole or by adding the tens and ones separately.

Children may also count back on a number line to subtract, again by jumping to the nearest 10 and then subtracting the rest of the number.

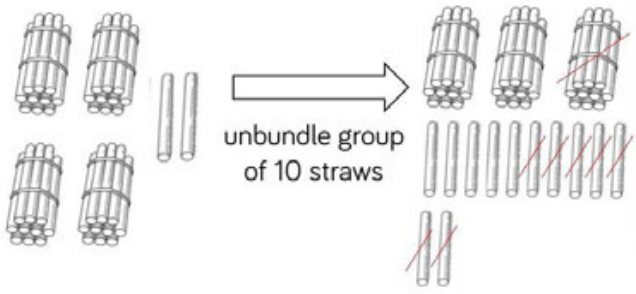
Blank number lines can also be used effectively to help children subtract by finding the difference between numbers. This can be done by starting with the smaller number and then counting on to the larger number. They then add up the parts they have counted on to find the difference between the numbers.

Straws

7 + 6 = 13



42 − 17 = 25



Benefits

Straws are an effective way to support children in their understanding of exchange when adding and subtracting 2-digit numbers.

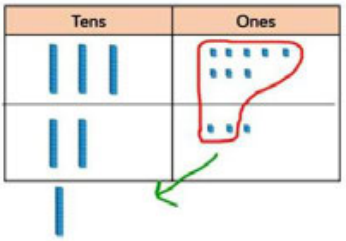
Children can be introduced to the idea of bundling groups of ten when adding smaller numbers and when representing 2-digit numbers. Use elastic bands or other ties to make bundles of ten straws.

When adding numbers, children bundle a group of 10 straws to represent the exchange from 10 ones to 1 ten. They then add the individual straws (ones) and bundles of straws (tens) to find the total.

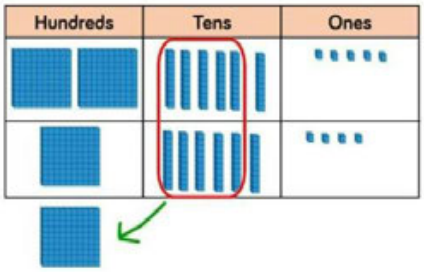
When subtracting numbers, children unbundle a group of 10 straws to represent the exchange from 1 ten to 10 ones.

Straws provide a good stepping stone to adding and subtracting with Base 10/Dienes.

Base 10/Dienes (addition)



$$\begin{array}{r} 38 \\ +\,23 \\ \hline 61 \\ \hline 1 \end{array}$$



$$\begin{array}{r} 265 \\ +\,164 \\ \hline 429 \\ \hline 1 \end{array}$$

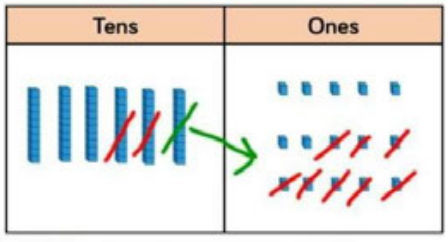
Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model.

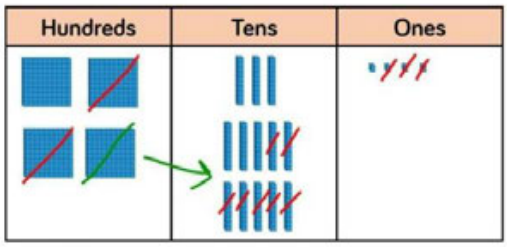
Children should first add without an exchange before moving on to addition with exchange.. The representation becomes less efficient with larger numbers due to the size of Base 10. In this case, place value counters may be the better model to use.

When adding, always start with the smallest place value column. Here are some questions to support children.
How many ones are there altogether?
Can we make an exchange? (Yes or No)
How many do we exchange? (10 ones for 1 ten, show exchanged 10 in tens column by writing 1 in column)
How many ones do we have left? (Write in ones column)
Repeat for each column.

Base 10/Dienes (subtraction)



$$\begin{array}{r} {}^{5}\cancel{6}\,{}^{1}5 \\ -\,28 \\ \hline 37 \\ \hline \end{array}$$



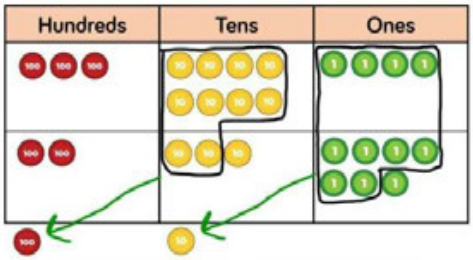
$$\begin{array}{r} {}^{3}\cancel{4}\,{}^{1}35 \\ -\,273 \\ \hline 262 \\ \hline \end{array}$$

Benefits

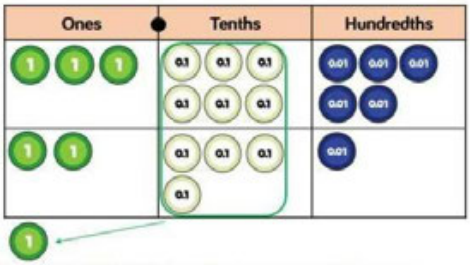
Using Base 10 or Dienes is an effective way to support children's understanding of column subtraction. It is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model.

Children should first subtract without an exchange before moving on to subtraction with exchange. When building the model, children should just make the minuend using Base 10, they then subtract the subtrahend. Highlight this difference to addition to avoid errors by making both numbers. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.
This model is efficient with up to 4-digit numbers. Place value counters are more efficient with larger numbers and decimals.

Place Value Counters (addition)



$$\begin{array}{r} 384 \\ +\ 237 \\ \hline 621 \\ \hline 1\ 1 \end{array}$$



$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

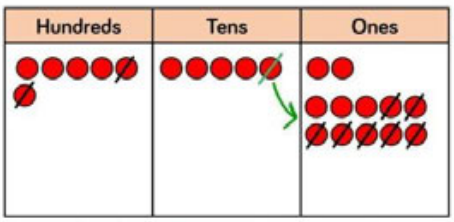
Benefits

Using place value counters is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

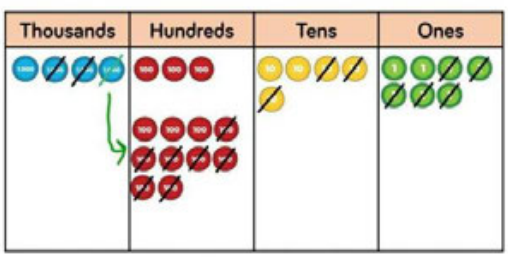
Children should first add without an exchange before moving on to addition with exchange. Different place value counters can be used to represent larger numbers or decimals. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

When adding money, children can also use coins to support their understanding. It is important that children consider how the coins link to the written calculation especially when adding decimal amounts.

Place Value Counters (Subtraction)



$$\begin{array}{r} {}^{4}\cancel{6}\,{}^{1}\cancel{5}2 \\ -\ 207 \\ \hline 445 \\ \hline \end{array}$$



$$\begin{array}{r} {}^{3}\cancel{4}\,{}^{1}357 \\ -\ 2735 \\ \hline 1622 \\ \hline \end{array}$$

Benefits

Using place value counters is an effective way to support children's understanding of column subtraction. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

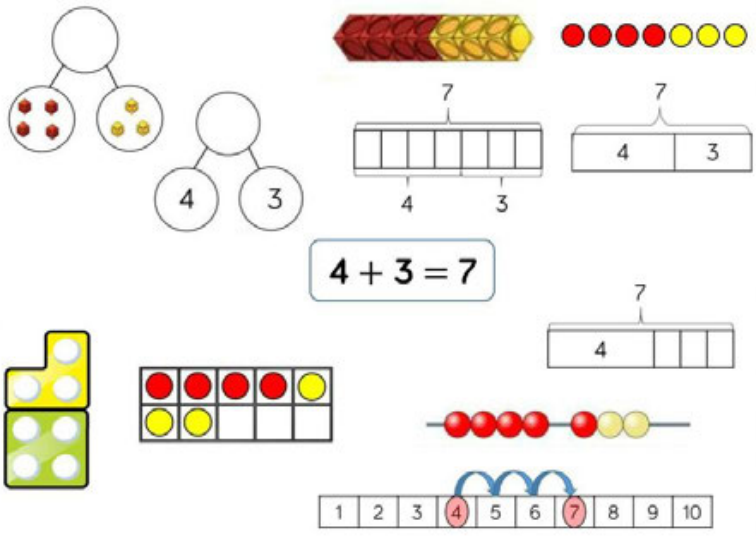
Children should first subtract without an exchange before moving on to subtraction with exchange. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

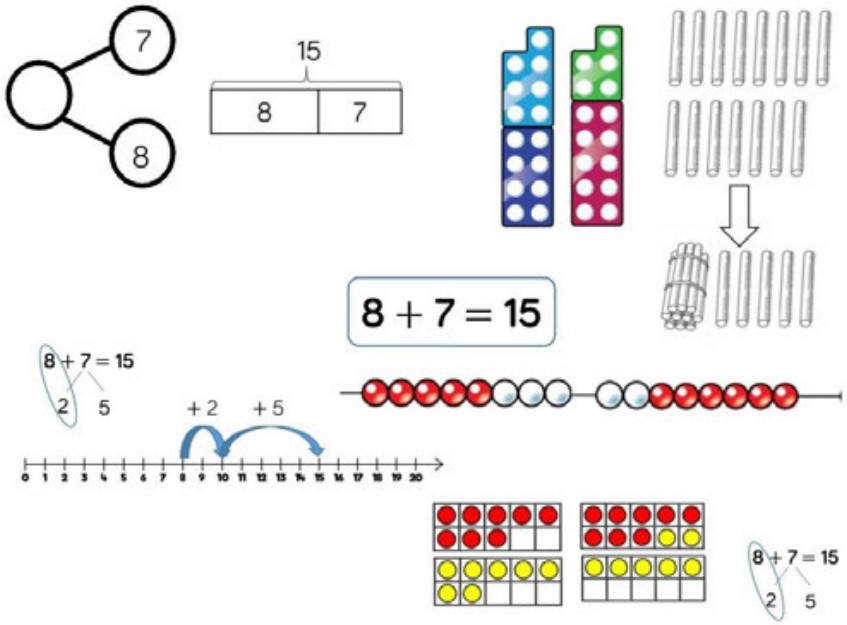
When building the model, children should just make the minuend using counters, they then subtract the subtrahend. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.

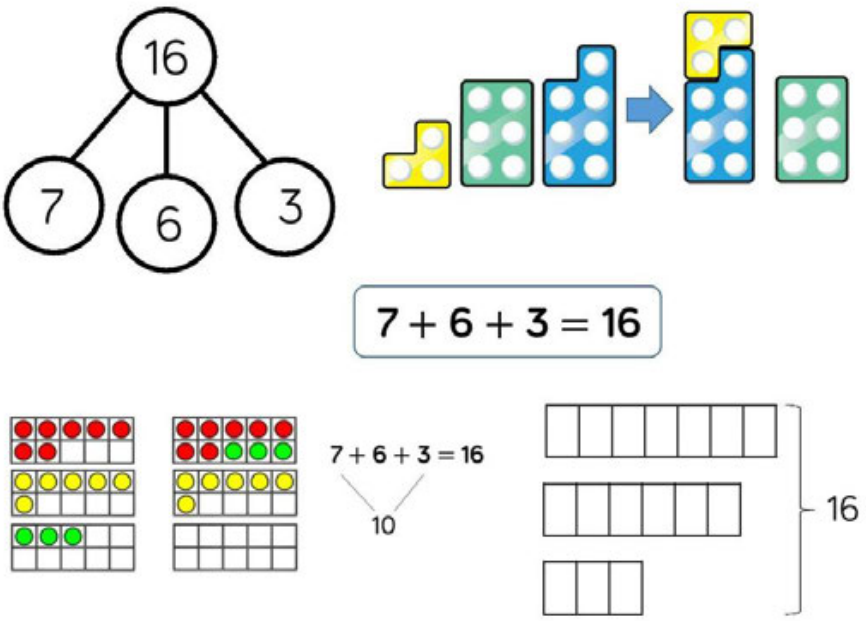
Addition

Skill	Year	Representations and models	
Add two 1-digit numbers to 10	1	Part-whole model Bar model Number shapes	Ten frames (within 10) Bead strings (10) Number tracks
Add 1 and 2-digit numbers to 20	1	Part-whole model Bar model Number shapes Ten frames (within 20)	Bead strings (20) Number tracks Number lines (labelled) Straws
Add three 1-digit numbers	2	Part-whole model Bar model	Ten frames (within 20) Number shapes
Add 1 and 2-digit numbers to 100	2	Part-whole model Bar model Number lines (labelled)	Number lines (blank) Straws Hundred square

Skill	Year	Representations and models	
Add two 2-digit numbers	2	Part-whole model Bar model Number lines (blank) Straws	Base 10 Place value counters Column addition
Add with up to 3-digits	3	Part-whole model Bar model	Base 10 Place value counters Column addition
Add with up to 4-digits	4	Part-whole model Bar model	Base 10 Place value counters Column addition
Add with more than 4 digits	5	Part-whole model Bar model	Place value counters Column addition
Add with up to 3 decimal places	5	Part-whole model Bar model	Place value counters Column addition

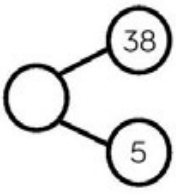
Skill: Add 1-digit numbers within 10	Year: 1
	When adding numbers to 10, children can explore both aggregation and augmentation. The part-whole model, discrete and continuous bar model, number shapes and ten frame support aggregation. The combination bar model, ten frame, bead string and number track all support augmentation.

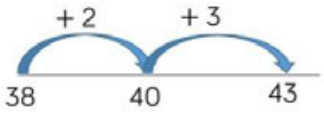
Skill: Add 1 and 2-digit numbers to 20	Year: 1/2
	When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. Different manipulatives can be used to represent this exchange. Use concrete resources alongside number lines to support children in understanding how to partition their jumps.

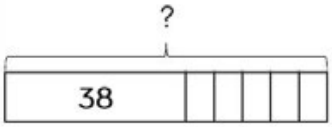
Skill: Add three 1-digit numbers	Year: 2
	When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently. This supports children in their understanding of commutativity. Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.

Skill: Add 1-digit and 2-digit numbers to 100

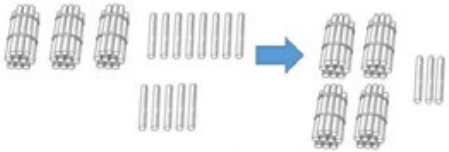
Year: 2/3







$38 + 5 = 43$



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

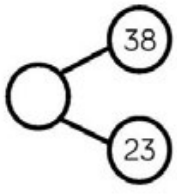
When adding single digits to a two-digit number, children should be encouraged to count on from the larger number.

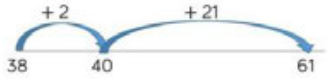
They should also apply their knowledge of number bonds to add more efficiently e.g. $8 + 5 = 13$ so $38 + 5 = 43$.

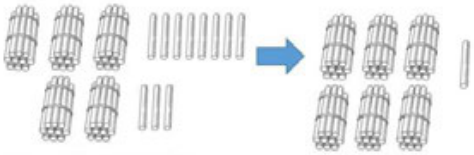
Hundred squares and straws can support children to find the number bond to 10.

Skill: Add two 2-digit numbers to 100

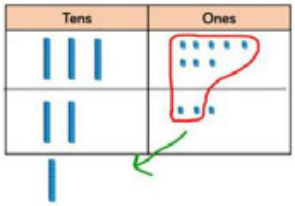
Year: 2/3



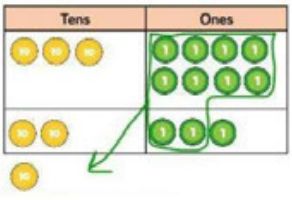




$38 + 23 = 61$



$$\begin{array}{r} 38 \\ +\,23 \\ \hline 61 \\ \hline 1 \end{array}$$

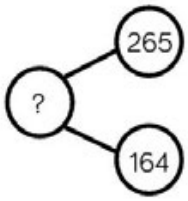


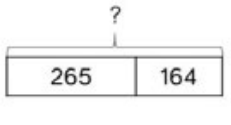
At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

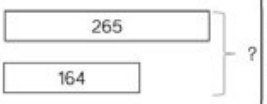
Children can also use a blank number line to count on to find the total. Encourage them to jump to multiples of 10 to become more efficient.

Skill: Add numbers with up to 3 digits

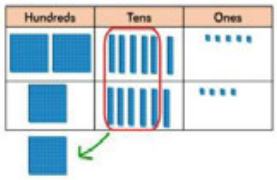
Year: 3



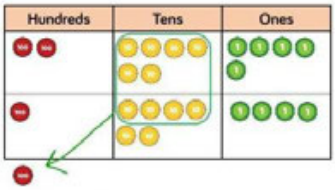




$$265 + 164 = 429$$



$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ {\scriptstyle 1\ \ \ \ \ } \end{array}$$



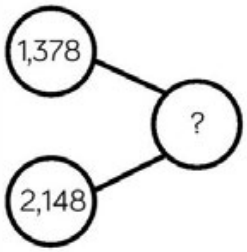
Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 3 digits.

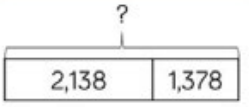
Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

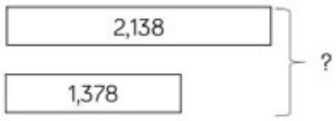
Plain counters on a place value grid can also be used to support learning.

Skill: Add numbers with up to 4 digits

Year: 4

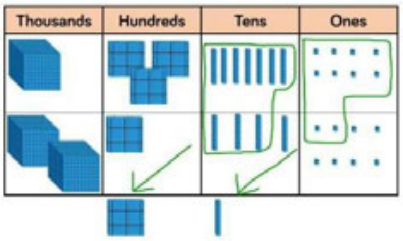


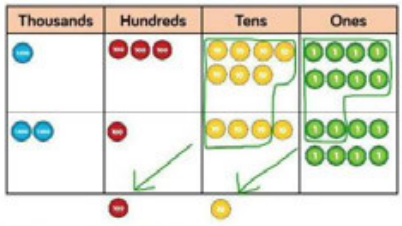




$$\begin{array}{r} 1\ 3\ 7\ 8 \\ +\ 2\ 1\ 4\ 8 \\ \hline 3\ 5\ 2\ 6 \\ {\scriptstyle 1\ 1\ \ \ } \end{array}$$

$$1{,}378 + 2{,}148 = 3{,}526$$





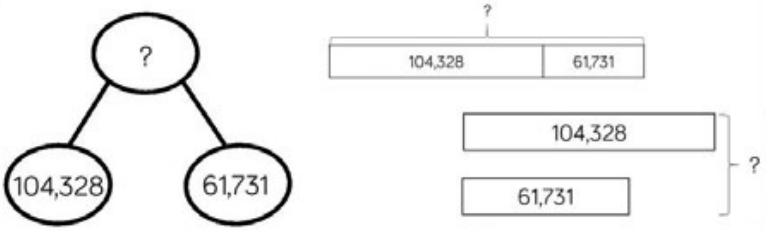
Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 4 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

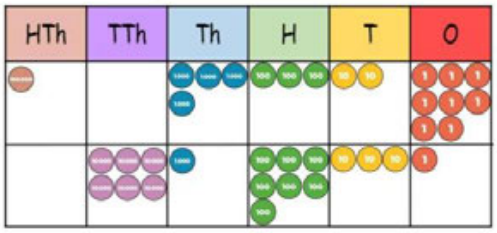
Plain counters on a place value grid can also be used to support learning.

Skill: Add numbers with more than 4 digits

Year: 5/6



104,328 + 61,731 = 166,059



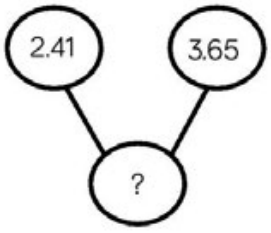
1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9
			1		

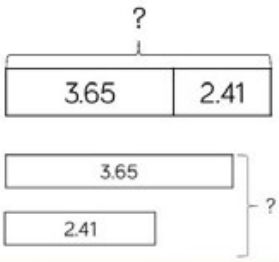
Place value counters or plain counters on a place value grid are the most effective concrete resources when adding numbers with more than 4 digits.

At this stage, children should be encouraged to work in the abstract, using the column method to add larger numbers efficiently.

Skill: Add with up to 3 decimal places

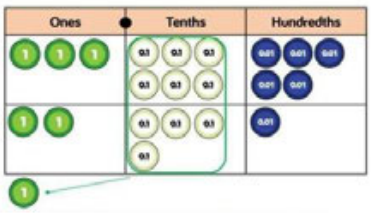
Year: 5

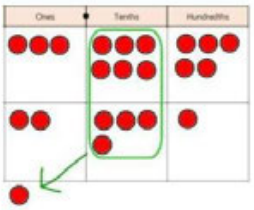




$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

3.65 + 2.41 = 6.06





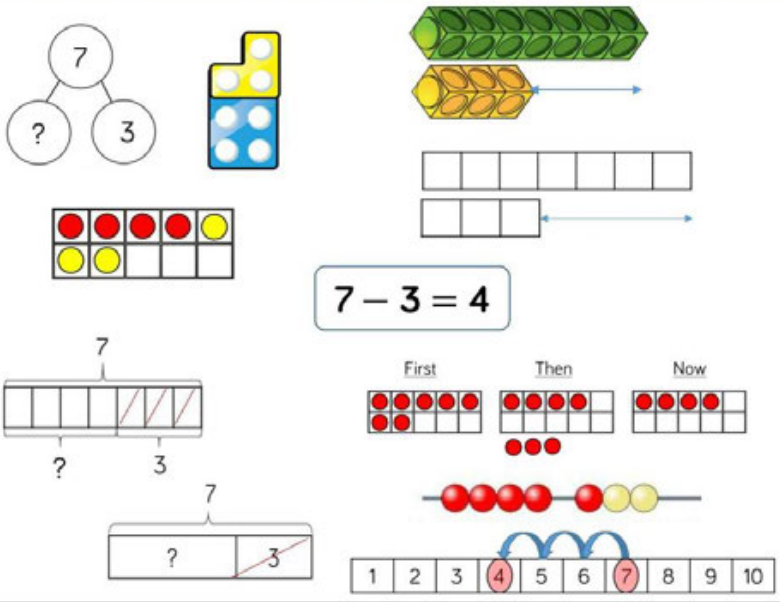
Place value counters and plain counters on a place value grid are the most effective manipulatives when adding decimals with 1, 2 and then 3 decimal places.

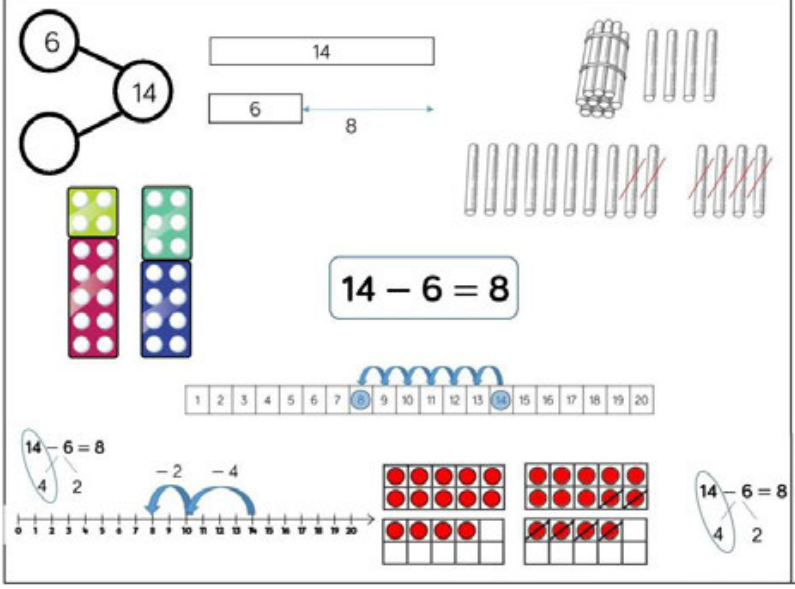
Ensure children have experience of adding decimals with a variety of decimal places. This includes putting this into context when adding money and other measures.

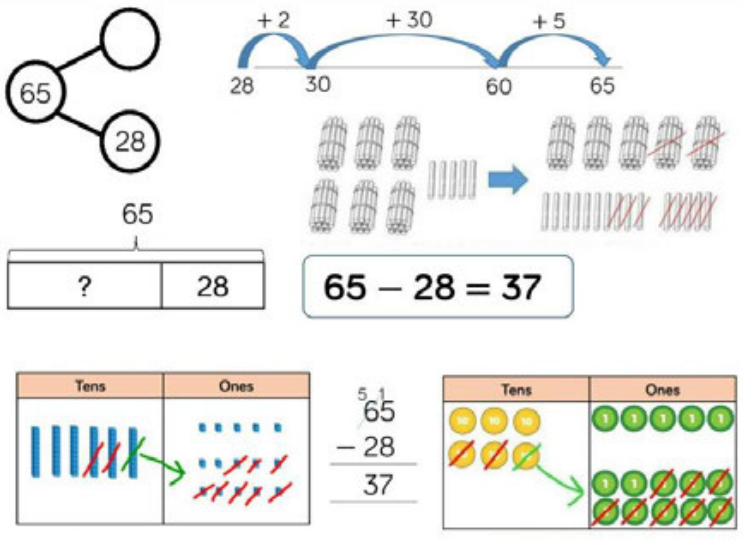
Subtraction

Skill	Year	Representations and models	
Subtract two 1-digit numbers to 10	1	Part-whole model Bar model Number shapes	Ten frames (within 10) Bead strings (10) Number tracks
Subtract 1 and 2-digit numbers to 20	1	Part-whole model Bar model Number shapes Ten frames (within 20)	Bead string (20) Number tracks Number lines (labelled) Straws
Subtract 1 and 2-digit numbers to 100	2	Part-whole model Bar model Number lines (labelled)	Number lines (blank) Straws Hundred square
Subtract two 2-digit numbers	2	Part-whole model Bar model Number lines (blank) Straws	Base 10 Place value counters Column subtraction

Skill	Year	Representations and models	
Subtract with up to 3-digits	3	Part-whole model Bar model	Base 10 Place value counters Column subtraction
Subtract with up to 4-digits	4	Part-whole model Bar model	Base 10 Place value counters Column subtraction
Subtract with more than 4 digits	5	Part-whole model Bar model	Place value counters Column subtraction
Subtract with up to 3 decimal places	5	Part-whole model Bar model	Place value counters Column subtraction

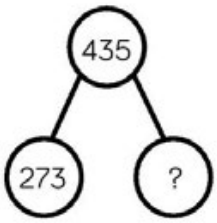
Skill: Subtract 1-digit numbers within 10	Year: 1
	Part-whole models, bar models, ten frames and number shapes support partitioning. Ten frames, number tracks, single bar models and bead strings support reduction. Cubes and bar models with two bars can support finding the difference.

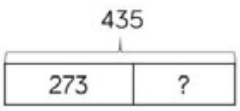
Skill: Subtract 1 and 2-digit numbers to 20	Year: 1/2
	When subtracting one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. Children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Ten frames, number shapes and number lines are particularly useful for this.

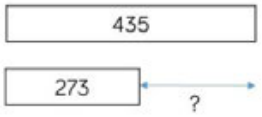
Skill: Subtract 1 and 2-digit numbers to 100	Year: 2
	At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient. Children can also use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.

Skill: Subtract numbers with up to 3 digits

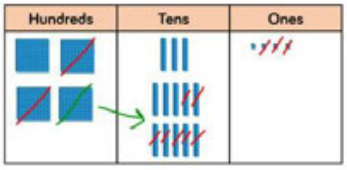
Year: 3



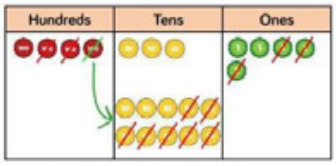




435 − 273 = 262



$$\begin{array}{r} {}^{3}\not{4}\,{}^{1}\not{3}5 \\ -\ 273 \\ \hline 262 \end{array}$$



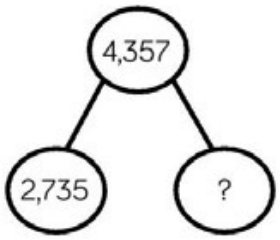
Base 10 and place value counters are the most effective manipulative when subtracting numbers with up to 3 digits.

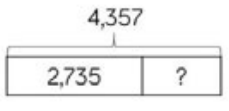
Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

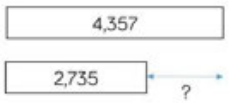
Plain counters on a place value grid can also be used to support learning.

Skill: Subtract numbers with up to 4 digits

Year: 4

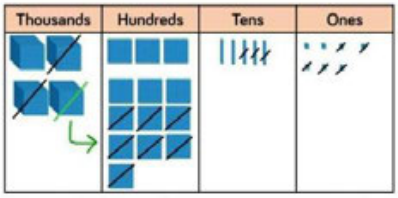


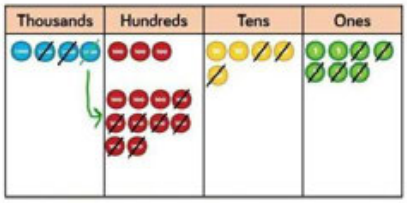




$$\begin{array}{r} {}^{3}\not{4}\,{}^{1}\not{3}57 \\ -\ 2735 \\ \hline 1622 \end{array}$$

4,357 − 2,735 = 1,622





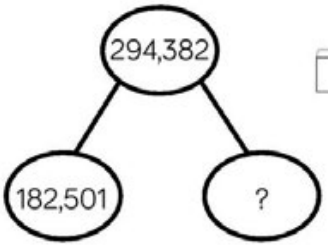
Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 4 digits.

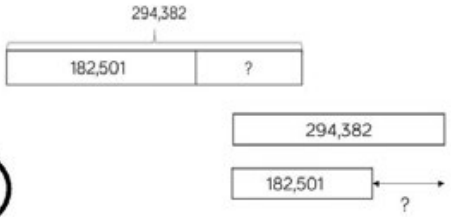
Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

Plain counters on a place value grid can also be used to support learning.

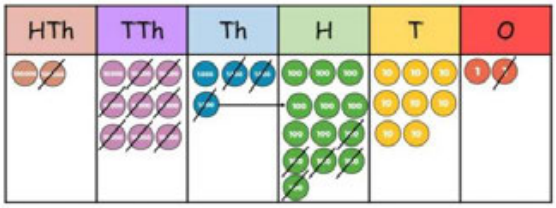
Skill: Subtract numbers with more than 4 digits

Year: 5/6





$$294{,}382 - 182{,}501 = 111{,}881$$



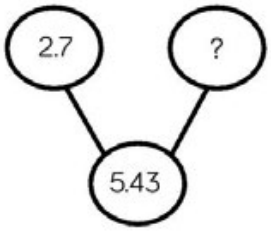
	2	9	$^{3}\not{3}$	$^{1}3$	8	2
−	1	8	2	5	0	1
	1	1	1	8	8	1

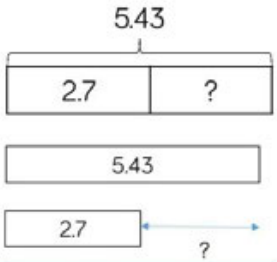
Place value counters or plain counters on a place value grid are the most effective concrete resource when subtracting numbers with more than 4 digits.

At this stage, children should be encouraged to work in the abstract, using column method to subtract larger numbers efficiently.

Skill: Subtract with up to 3 decimal places

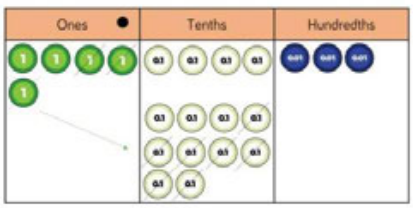
Year: 5

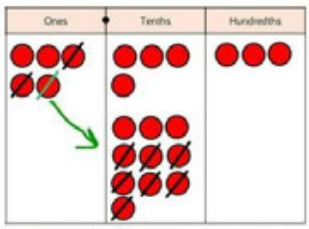




$$\begin{array}{r} {}^{4}\not{5}\,{}^{1}43 \\ -\ 2.7 \\ \hline 2.73 \end{array}$$

$$5.43 - 2.7 = 2.73$$





Place value counters and plain counters on a place value grid are the most effective manipulative when subtracting decimals with 1, 2 and then 3 decimal places.

Ensure children have experience of subtracting decimals with a variety of decimal places. This includes putting this into context when subtracting money and other measures.

Glossary

Addend - A number to be added to another.

Aggregation - combining two or more quantities or measures to find a total.

Augmentation - increasing a quantity or measure by another quantity.

Commutative – numbers can be added in any order.

Complement – in addition, a number and its complement make a total e.g. 300 is the complement to 700 to make 1,000

Difference – the numerical difference between two numbers is found by comparing the quantity in each group.

Exchange – Change a number or expression for another of an equal value.

Minuend – A quantity or number from which another is subtracted.

Partitioning – Splitting a number into its component parts.

Reduction – Subtraction as take away.

Subitise – Instantly recognise the number of objects in a small group without needing to count.

Subtrahend - A number to be subtracted from another.

Sum - The result of an addition.

Total – The aggregate or the sum found by addition.

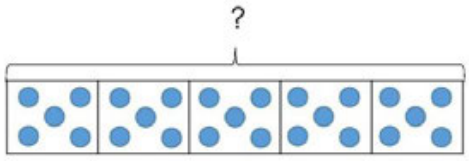
Year 1 - 6

Calculation Policy
Multiplication and Division

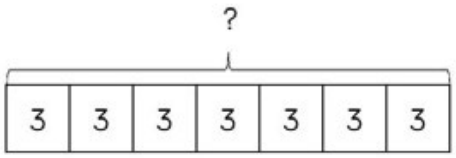
#MathsEveryoneCan

White Rose Maths

Bar Model

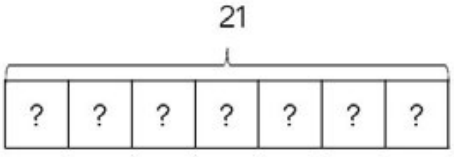


$5 \times 5 = 25$

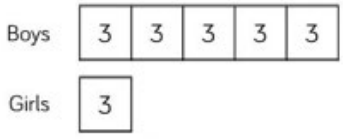


$3 \times 7 = 21$

$7 \times 3 = 21$



$21 \div 7 = 3$



Benefits

Children can use the single bar model to represent multiplication as repeated addition. They could use counters, cubes or dots within the bar model to support calculation before moving on to placing digits into the bar model to represent the multiplication.

Division can be represented by showing the total of the bar model and then dividing the bar model into equal groups.

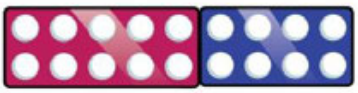
It is important when solving word problems that the bar model represents the problem.

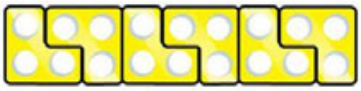
Sometimes, children may look at scaling problems. In this case, more than one bar model is useful to represent this type of problem, e.g. There are 3 girls in a group. There are 5 times more boys than girls. How many boys are there?
The multiple bar model provides an opportunity to compare the groups.

Number Shapes

$5 \times 4 = 20$
$4 \times 5 = 20$

$5 \times 4 = 20$
$4 \times 5 = 20$





$18 \div 3 = 6$

Benefits

Number shapes support children's understanding of multiplication as repeated addition.

Children can build multiplications in a row using the number shapes. When using odd numbers, encourage children to interlock the shapes so there are no gaps in the row. They can then use the tens number shapes along with other necessary shapes over the top of the row to check the total. Using the number shapes in multiplication can support children in discovering patterns of multiplication e.g. odd × odd = even, odd × even = odd, even × even = even.

When dividing, number shapes support children's understanding of division as grouping. Children make the number they are dividing and then place the number shape they are dividing by over the top of the number to find how many groups of the number there are altogether e.g. There are 6 groups of 3 in 18.

Bead Strings

$5 \times 3 = 15$
$3 \times 5 = 15$

$15 \div 3 = 5$

$5 \times 3 = 15$
$3 \times 5 = 15$

$15 \div 5 = 3$

$4 \times 5 = 20$
$5 \times 4 = 20$

$20 \div 4 = 5$

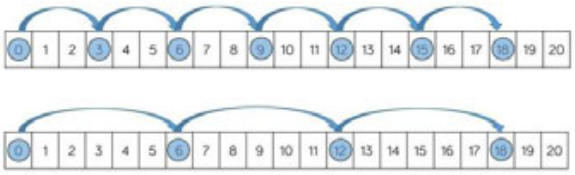
Benefits

Bead strings to 100 can support children in their understanding of multiplication as repeated addition. Children can build the multiplication using the beads. The colour of beads supports children in seeing how many groups of 10 they have, to calculate the total more efficiently.
Encourage children to count in multiples as they build the number e.g. 4, 8, 12, 16, 20.

Children can also use the bead string to count forwards and backwards in multiples, moving the beads as they count.

When dividing, children build the number they are dividing and then group the beads into the number they are dividing by e.g. 20 divided by 4 – Make 20 and then group the beads into groups of four. Count how many groups you have made to find the answer.

Number Tracks



$6 \times 3 = 18$
$3 \times 6 = 18$

$18 \div 3 = 6$

Benefits

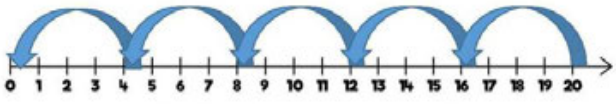
Number tracks are useful to support children to count in multiples, forwards and backwards. Moving counters or cubes along the number track can support children to keep track of their counting. Translucent counters help children to see the number they have landed on whilst counting.

When multiplying, children place their counter on 0 to start and then count on to find the product of the numbers.
When dividing, children place their counter on the number they are dividing and the count back in jumps of the number they are dividing by until they reach 0.
Children record how many jumps they have made to find the answer to the division.

Number tracks can be useful with smaller multiples but when reaching larger numbers they can become less efficient.

Number Lines (labelled)

$4 \times 5 = 20$
$5 \times 4 = 20$



$20 \div 4 = 5$

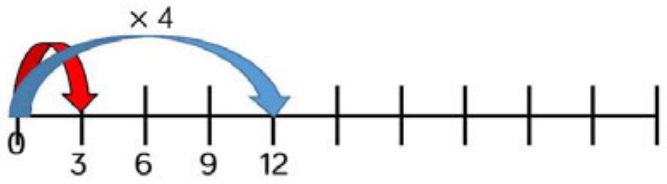
Benefits

Labelled number lines are useful to support children to count in multiples, forwards and backwards as well as calculating single-digit multiplications.

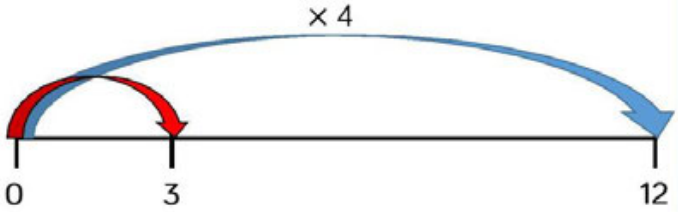
When multiplying, children start at 0 and then count on to find the product of the numbers.
When dividing, start at the number they are dividing and the count back in jumps of the number they are dividing by until they reach 0.
Children record how many jumps they have made to find the answer to the division.

Labelled number lines can be useful with smaller multiples, however they become inefficient as numbers become larger due to the required size of the number line.

Number Lines (blank)



A red car travels 3 miles.
A blue car 4 times further.
How far does the blue car travel?



A blue car travels 12 miles.
A red car 4 times less.
How far does the red car travel?

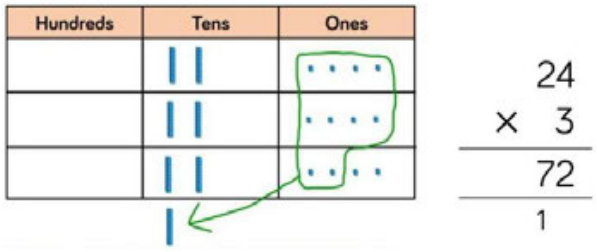
Benefits

Children can use blank number lines to represent scaling as multiplication or division.

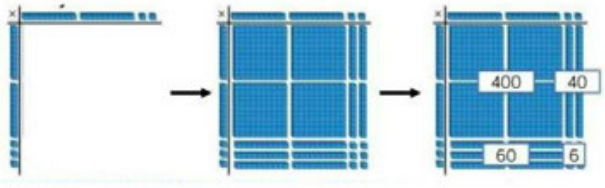
Blank number lines with intervals can support children to represent scaling accurately. Children can label intervals with multiples to calculate scaling problems.

Blank number lines without intervals can also be used for children to represent scaling.

Base 10/Dienes (multiplication)



$$\begin{array}{r} 24 \\ \times\ 3 \\ \hline 72 \\ \hline 1 \end{array}$$



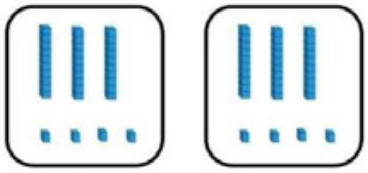
Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of column multiplication. It is important that children write out their calculation alongside the equipment so they can see how the concrete and written representations match.

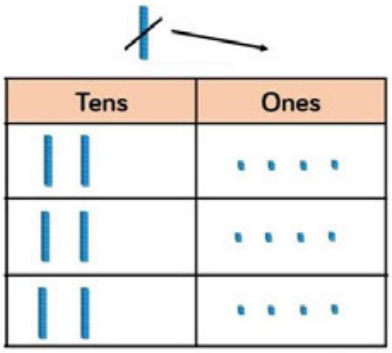
As numbers become larger in multiplication or the amounts of groups becomes higher, Base 10 / Dienes becomes less efficient due to the amount of equipment and number of exchanges needed.

Base 10 also supports the area model of multiplication well. Children use the equipment to build the number in a rectangular shape which they then find the area of by calculating the total value of the pieces This area model can be linked to the grid method or the formal column method of multiplying 2-digits by 2-digits.

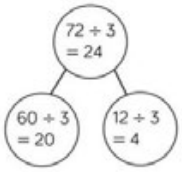
Base 10/Dienes (division)



$68 \div 2 = 34$



$72 \div 3 = 24$



Benefits

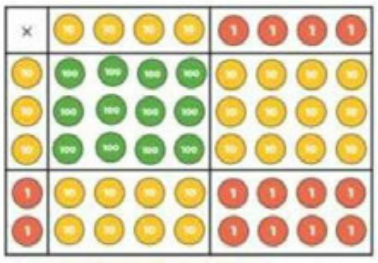
Using Base 10 or Dienes is an effective way to support children's understanding of division.

When numbers become larger, it can be an effective way to move children from representing numbers as ones towards representing them as tens and ones in order to divide. Children can then share the Base 10/ Dienes between different groups e.g. by drawing circles or by rows on a place value grid.

When they are sharing, children start with the larger place value and work from left to right. If there are any left in a column, they exchange e.g. one ten for ten ones. When recording, encourage children to use the part-whole model so they can consider how the number has been partitioned in order to divide. This will support them with mental methods.

Place Value Counters (multiplication)

$$\begin{array}{r} 34 \\ \times\ 5 \\ \hline 170 \\ \hline 1\ 2 \end{array}$$



$$\begin{array}{r} 44 \\ \times\ 32 \\ \hline 8 \\ 80 \\ 120 \\ +\ 1200 \\ \hline 1408 \\ \hline 1 \end{array}$$

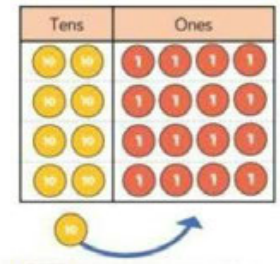
Benefits

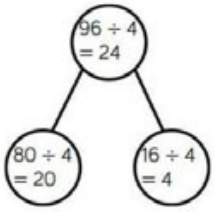
Using place value counters is an effective way to support children's understanding of column multiplication. It is important that children write out their calculation alongside the equipment so they can see how the concrete and written match.

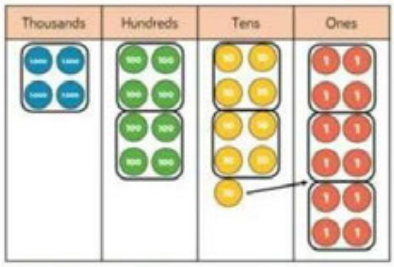
As numbers become larger in multiplication or the amounts of groups becomes higher, Base 10 / Dienes becomes less efficient due to the amount of equipment and number of exchanges needed The counters should be used to support the understanding of the written method rather than support the arithmetic.

Place value counters also support the area model of multiplication well. Children can see how to multiply 2-digit numbers by 2-digit numbers.

Place Value Counters (division)







$$\begin{array}{r} 1223 \\ 4\overline{)\,4892^{1}} \end{array}$$

Benefits

Using place value counters is an effective way to support children's understanding of division.

When working with smaller numbers, children can use place value counters to share between groups. They start by sharing the larger place value column and work from left to right. If there are any counters left over once they have been shared, they exchange the counter e.g. exchange one ten for ten ones. This method can be linked to the part-whole model to support children to show their thinking.

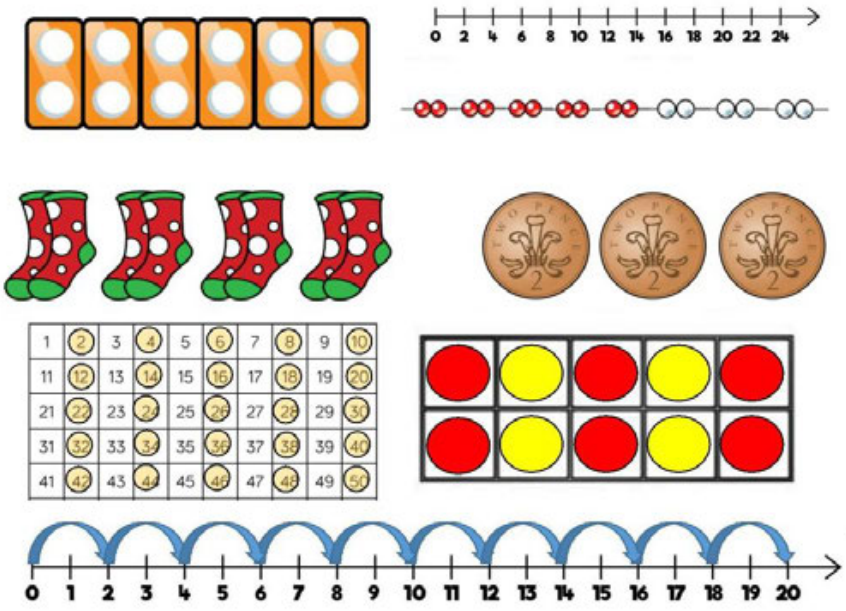
Place value counters also support children's understanding of short division by grouping the counters rather than sharing them. Children work from left to right through the place value columns and group the counters in the number they are dividing by. If there are any counters left over after they have been grouped, they exchange the counter e.g. exchange one hundred for ten tens.

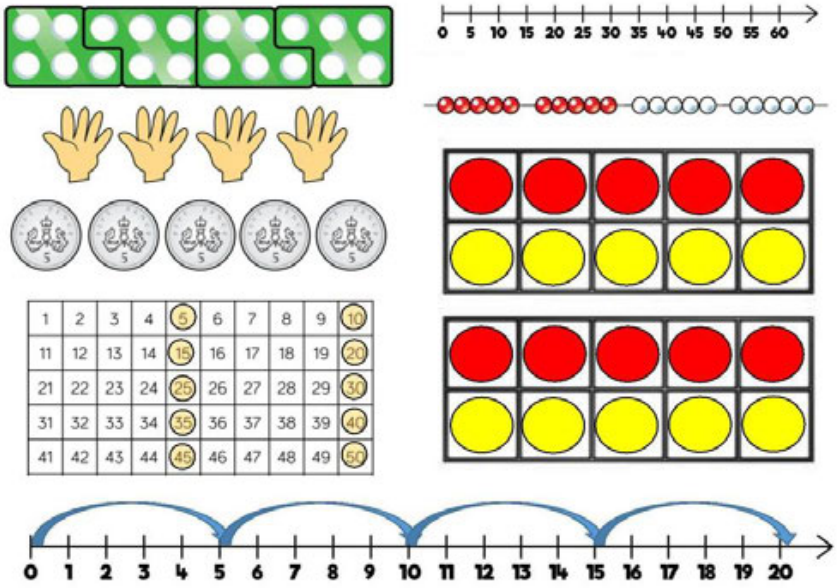
Times Tables

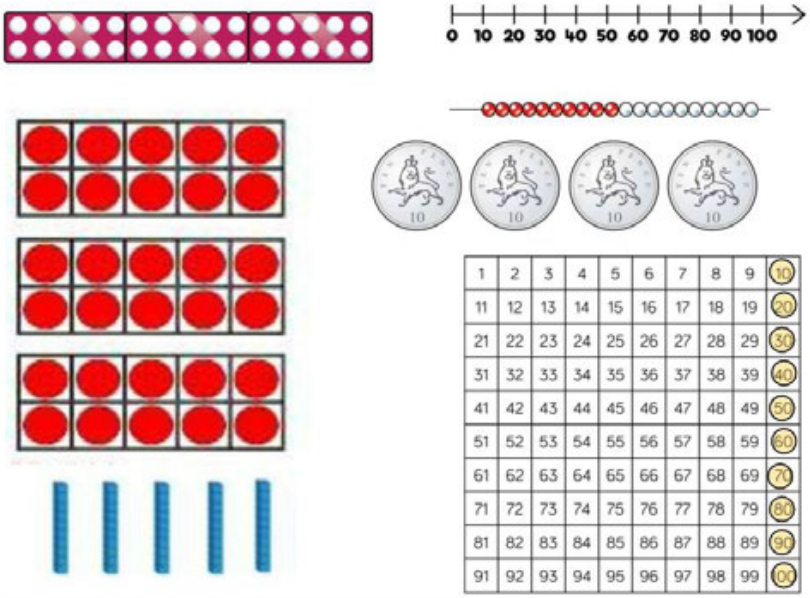
Skill	Year	Representations and models	
Recall and use multiplication and division facts for the 2-times table	2	Bar model Number shapes Counters Money	Ten frames Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 5-times table	2	Bar model Number shapes Counters Money	Ten frames Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 10-times table	2	Hundred square Number shapes Counters Money	Ten frames Bead strings Number lines Base 10

Skill	Year	Representations and models	
Recall and use multiplication and division facts for the 3-times table	3	Hundred square Number shapes Counters	Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 4-times table	3	Hundred square Number shapes Counters	Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 8-times table	3	Hundred square Number shapes	Bead strings Number tracks Everyday objects
Recall and use multiplication and division facts for the 6-times table	4	Hundred square Number shapes	Bead strings Number tracks Everyday objects

Skill	Year	Representations and models	
Recall and use multiplication and division facts for the 7-times table	4	Hundred square Number shapes	Bead strings Number lines
Recall and use multiplication and division facts for the 9-times table	4	Hundred square Number shapes	Bead strings Number lines
Recall and use multiplication and division facts for the 11-times table	4	Hundred square Base 10	Place value counters Number lines
Recall and use multiplication and division facts for the 12-times table	4	Hundred square Base 10	Place value counters Number lines

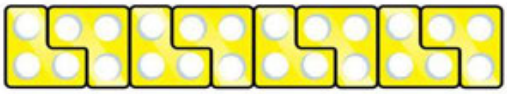
Skill: 2 times table	Year: 2
	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the two times table, using concrete manipulatives to support. Notice how all the numbers are even and there is a pattern in the ones. Use different models to develop fluency.

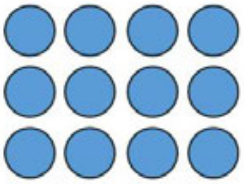
Skill: 5 times table	Year: 2
	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the five times table, using concrete manipulatives to support. Notice the pattern in the ones as well as highlighting the odd, even, odd, even pattern.

Skill: 10 times table	Year: 2
	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the ten times table, using concrete manipulatives to support. Notice the pattern in the digits- the ones are always 0, and the tens increase by 1 ten each time.

Skill: 3 times table

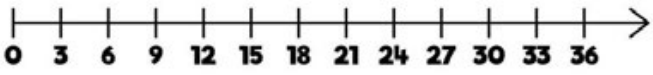
Year: 3





1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

3 6 9 12

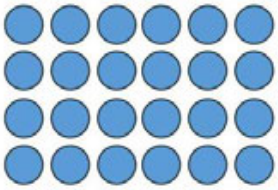


Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the three times table, using concrete manipulatives to support. Notice the odd, even, odd, even pattern using number shapes to support. Highlight the pattern in the ones using a hundred square.

Skill: 4 times table

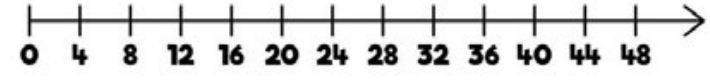
Year: 3



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

4 8 12 16

4	8	12	16	20
24	28	32	36	40
44	48	52	56	60



Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the four times table, using manipulatives to support. Make links to the 2 times table, seeing how each multiple is double the twos. Notice the pattern in the ones within each group of five multiples. Highlight that all the multiples are even using number shapes to support.

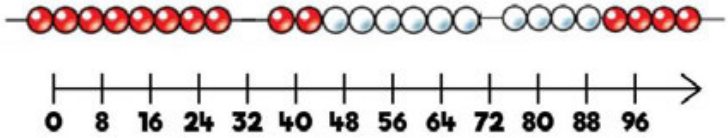
Skill: 8 times table

Year: 3

8 16 24 32

8	16	24	32	40
48	56	64	72	80

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



0 8 16 24 32 40 48 56 64 72 80 88 96

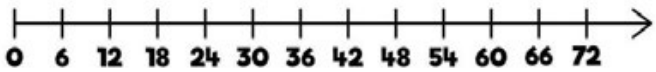
Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the eight times table, using manipulatives to support. Make links to the 4 times table, seeing how each multiple is double the fours. Notice the pattern in the ones within each group of five multiples. Highlight that all the multiples are even using number shapes to support.

Skill: 6 times table

Year: 4

6	12	18	24	30
36	42	48	54	60
66	72	78	84	90

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



0 6 12 18 24 30 36 42 48 54 60 66 72

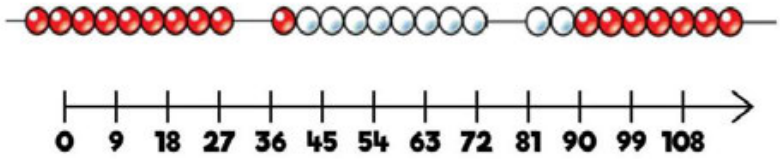
Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the six times table, using manipulatives to support. Make links to the 3 times table, seeing how each multiple is double the threes. Notice the pattern in the ones within each group of five multiples. Highlight that all the multiples are even using number shapes to support.

Skill: 9 times table

Year: 4

9	18	27	36	45
54	63	72	81	90

1	2	3	4	5	6	7	8	**9**	10
11	12	13	14	15	16	17	**18**	19	20
21	22	23	24	25	26	**27**	28	29	30
31	32	33	34	35	**36**	37	38	39	40
41	42	43	44	**45**	46	47	48	49	50
51	52	53	**54**	55	56	57	58	59	60
61	62	**63**	64	65	66	67	68	69	70
71	**72**	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	**90**
91	92	93	94	95	96	97	98	**99**	100



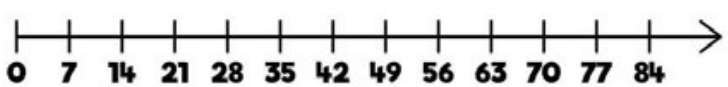
Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the nine times table, using concrete manipulatives to support. Notice the pattern in the tens and ones using the hundred square to support as well as noting the odd, even pattern within the multiples.

Skill: 7 times table

Year: 4

7	14	21	28	35
42	49	56	63	70

1	2	3	4	5	6	**7**	8	9	10
11	12	13	**14**	15	16	17	18	19	20
21	22	23	24	25	26	27	**28**	29	30
31	32	33	34	**35**	36	37	38	39	40
41	**42**	43	44	45	46	47	48	**49**	50
51	52	53	54	55	**56**	57	58	59	60
61	62	**63**	64	65	66	67	68	69	**70**
71	72	73	74	75	76	**77**	78	79	80
81	82	83	**84**	85	86	87	88	89	90
91	92	93	94	95	96	97	**98**	99	100



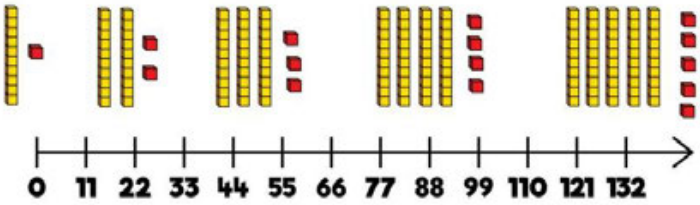
Encourage daily counting in multiples both forwards and backwards, supported by a number line or a hundred square. The seven times table can be trickier to learn due to the lack of obvious pattern in the numbers, however they already know several facts due to commutativity. Children can still see the odd, even pattern in the multiples using number shapes to support.

Skill: 11 times table

Year: 4

11	22	33	44	55	66
77	88	99	110	121	132

1	2	3	4	5	6	7	8	9	10
(11)	12	13	14	15	16	17	18	19	20
21	(22)	23	24	25	26	27	28	29	30
31	32	(33)	34	35	36	37	38	39	40
41	42	43	(44)	45	46	47	48	49	50
51	52	53	54	(55)	56	57	58	59	60
61	62	63	64	65	(66)	67	68	69	70
71	72	73	74	75	76	(77)	78	79	80
81	82	83	84	85	86	87	(88)	89	90
91	92	93	94	95	96	97	98	(99)	100



Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

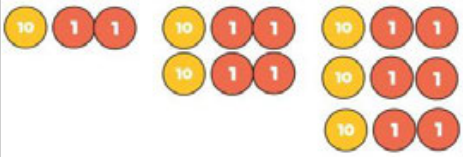
Look for patterns in the eleven times table, using concrete manipulatives to support. Notice the pattern in the tens and ones using the hundred square to support. Also consider the pattern after crossing 100

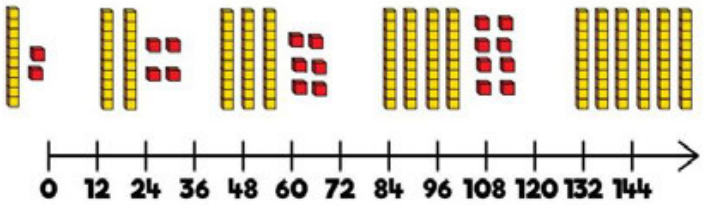
Skill: 12 times table

Year: 4

12	24	36	48	60
72	84	96	108	120
132	144			

1	2	3	4	5	6	7	8	9	10
11	(12)	13	14	15	16	17	18	19	20
21	22	23	(24)	25	26	27	28	29	30
31	32	33	34	35	(36)	37	38	39	40
41	42	43	44	45	46	47	(48)	49	50
51	52	53	54	55	56	57	58	59	(60)
61	62	63	64	65	66	67	68	69	70
71	(72)	73	74	75	76	77	78	79	80
81	82	83	(84)	85	86	87	88	89	90
91	92	93	94	95	(96)	97	98	99	100



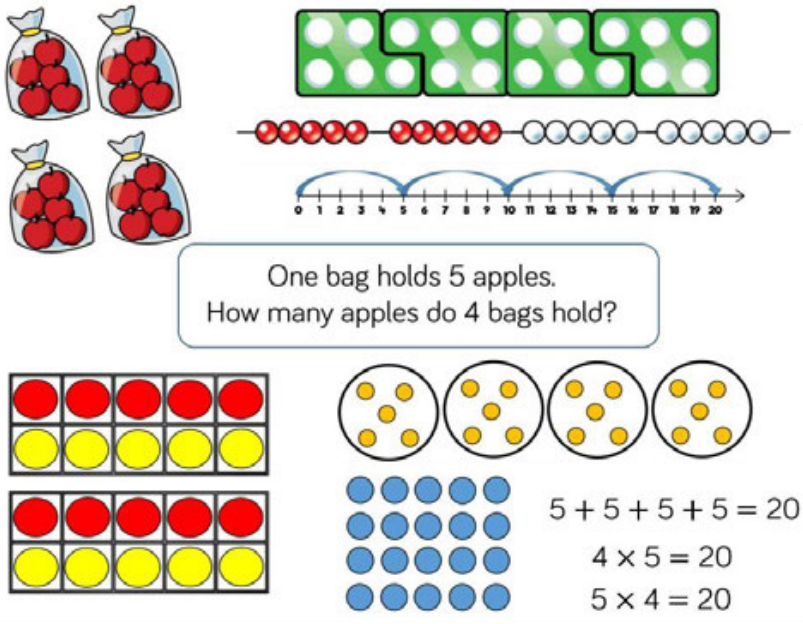


Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the 12 times table, using manipulatives to support. Make links to the 6 times table, seeing how each multiple is double the sixes. Notice the pattern in the ones within each group of five multiples. The hundred square can support in highlighting this pattern.

Multiplication

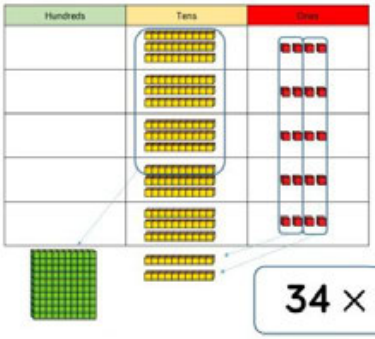
Skill	Year	Representations and models	
Solve one-step problems with multiplication	1/2	Bar model Number shapes Counters	Ten frames Bead strings Number lines
Multiply 2-digit by 1-digit numbers	3/4	Place value counters Base 10	Short written method Expanded written method
Multiply 3-digit by 1-digit numbers	4	Place value counters Base 10	Short written method
Multiply 4-digit by 1-digit numbers	5	Place value counters	Short written method

Skill	Year	Representations and models	
Multiply 2-digit by 2-digit numbers	5	Place value counters Base 10	Short written method Grid method
Multiply 2-digit by 3-digit numbers	5	Place value counters	Short written method Grid method
Multiply 2-digit by 4-digit numbers	5/6	Formal written method	

Skill: Solve 1-step problems using multiplication	Year: 1/2
	Children represent multiplication as repeated addition in many different ways. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally. In Year 2, children are introduced to the multiplication symbol.

Skill: Multiply 2-digit numbers by 1-digit numbers

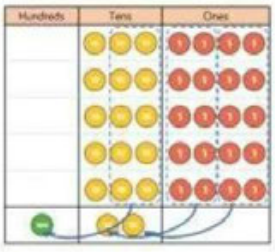
Year: 3/4



	H	T	O	
		3	4	
×			5	
		2	0	(5 × 4)
+	1	5	0	(5 × 30)
	1	7	0	

$34 \times 5 = 170$

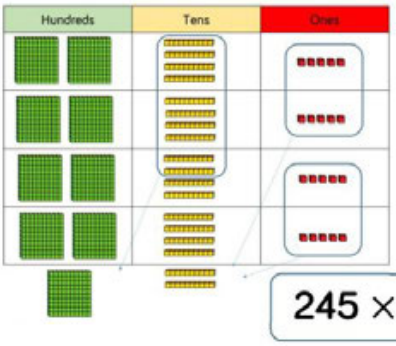
	H	T	O	
		3	4	
×			5	
	1	7	0	
	1	2		



Teachers may decide to first look at the expanded column method before moving on to the short multiplication method.
The place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge.

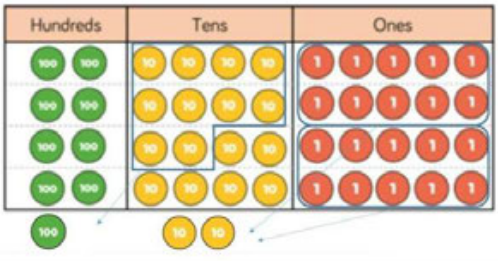
Skill: Multiply 3-digit numbers by 1-digit numbers

Year: 3/4



	H	T	O
	2	4	5
×			4
	9	8	0
	1	2	

$245 \times 4 = 980$



When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method.
Base 10 and place value counters continue to support the understanding of the written method.
Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers.

Skill: Multiply 4-digit numbers by 1-digit numbers

Year: 5

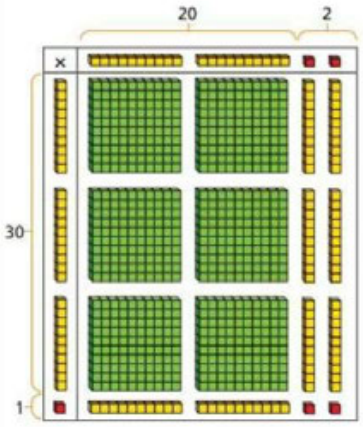
$1{,}826 \times 3 = 5{,}478$

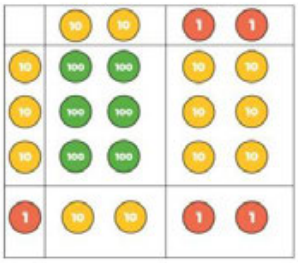
	Th	H	T	O
	1	8	2	6
×				3
	5	4	7	8
	2		1	

When multiplying 4-digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal written method.
If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.

Skill: Multiply 2-digit numbers by 2-digit numbers

Year: 5





×	20	2
30	600	60
1	20	2

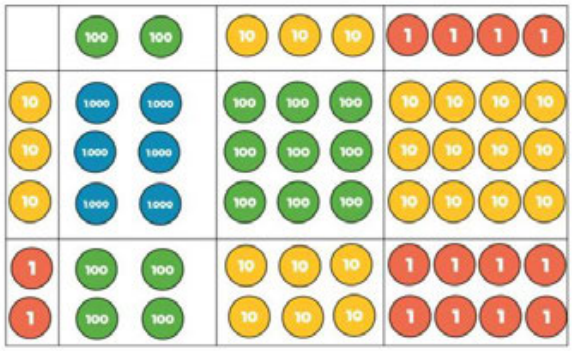
	H	T	O
		2	2
×		3	1
		2	2
	6	6	0
	6	8	2

$22 \times 31 = 682$

When multiplying a multi-digit number by 2-digits, use the area model to help children understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by the Base 10.
The grid method matches the area model as an initial written method before moving on to the formal written multiplication method.

Skill: Multiply 3-digit numbers by 2-digit numbers

Year: 5



Th	H	T	O
	2	3	4
×		3	2
	4	6	8
$^{1}7$	$^{1}0$	2	0
7	4	8	8

×	200	30	4
30	6,000	900	120
2	400	60	8

$234 \times 32 = 7{,}488$

Children can continue to use the area model when multiplying 3-digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of numbers.

Encourage children to move towards the formal written method, seeing the links with the grid method.

Skill: Multiply 4-digit numbers by 2-digit numbers

Year: 5/6

TTh	Th	H	T	O
	2	7	3	9
×			2	8
$^{2}2$	$^{5}1$	$^{3}9$	$^{7}1$	2
$^{1}5$	4	$^{1}7$	8	0
7	6	6	9	2
		1		

$2{,}739 \times 28 = 76{,}692$

When multiplying 4-digits by 2-digits, children should be confident in the written method.

If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method.

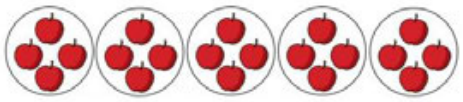
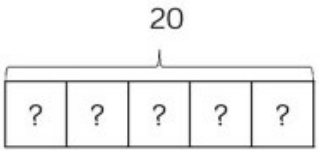
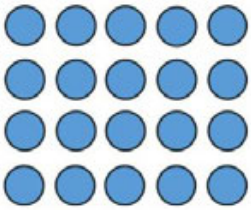
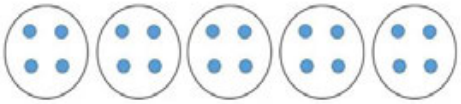
Consider where exchanged digits are placed and make sure this is consistent.

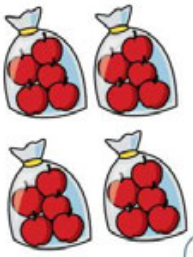
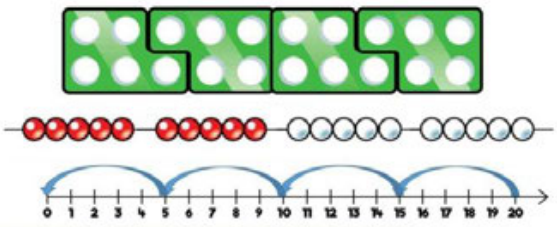
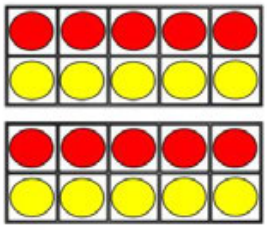
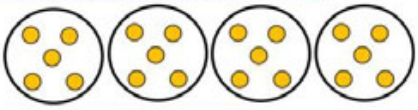
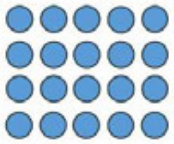
Division

Skill	Year	Representations and models	
Solve one-step problems with division (sharing)	1/2	Bar model Real life objects	Arrays Counters
Solve one-step problems with division (grouping)	1/2	Real life objects Number shapes Bead strings Ten frames	Number lines Arrays Counters
Divide 2-digits by 1-digit (no exchange sharing)	3	Straws Base 10 Bar model	Place value counters Part-whole model
Divide 2-digits by 1-digit (sharing with exchange)	3	Straws Base 10 Bar model	Place value counters Part-whole model

Skill	Year	Representations and models	
Divide 2-digits by 1-digit (sharing with remainders)	3/4	Straws Base 10 Bar model	Place value counters Part-whole model
Divide 2-digits by 1-digit (grouping)	4/5	Place value counters Counters	Place value grid Written short division
Divide 3-digits by 1-digit (sharing with exchange)	4	Base 10 Bar model	Place value counters Part-whole model
Divide 3-digits by 1-digit (grouping)	4/5	Place value counters Counters	Place value grid Written short division

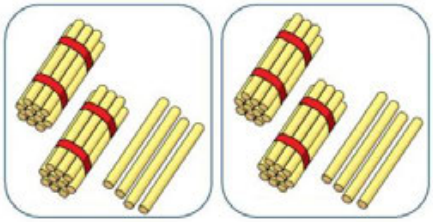
Skill	Year	Representations and models	
Divide 4-digits by 1-digit (grouping)	5	Place value counters Counters	Place value grid Written short division
Divide multi-digits by 2-digits (short division)	6	Written short division	List of multiples
Divide multi-digits by 2-digits (long division)	6	Written long division	List of multiples

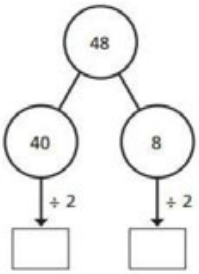
Skill: Solve 1-step problems using multiplication (sharing)	Year: 1/2
  There are 20 apples altogether. They are shared equally between 5 bags. How many apples are in each bag?   $20 \div 5 = 4$	Children solve problems by sharing amounts into equal groups. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally. In Year 2, children are introduced to the division symbol.

Skill: Solve 1-step problems using division (grouping)	Year: 1/2
  There are 20 apples altogether. They are put in bags of 5. How many bags are there?    $20 \div 5 = 4$	Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.

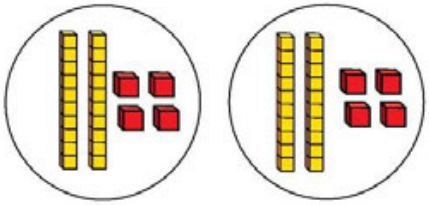
Skill: Divide 2-digits by 1-digit (sharing with no exchange)

Year: 1/2





48 ÷ 2 = 24



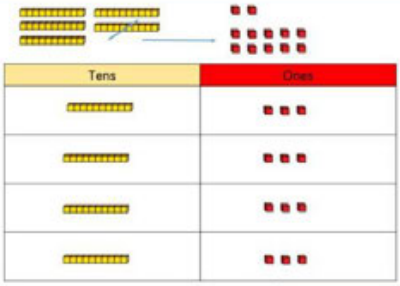
When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones.

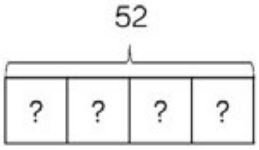
Straws, Base 10 and place value counters can all be used to share numbers into equal groups.

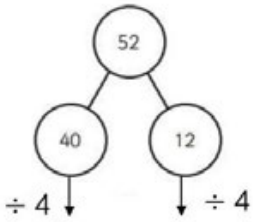
Part-whole models can provide children with a clear written method that matches the concrete representation.

Skill: Divide 2-digits by 1-digit (sharing with exchange)

Year: 3/4

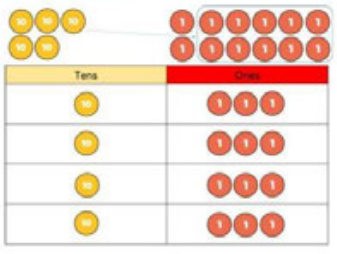






10 + 3 = 13

52 ÷ 4 = 13

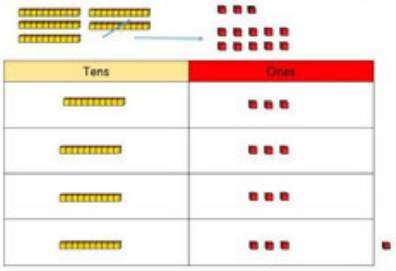


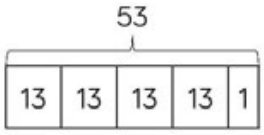
When dividing numbers involving an exchange, children can use Base 10 and place value counters to exchange one ten for ten ones.
Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows.

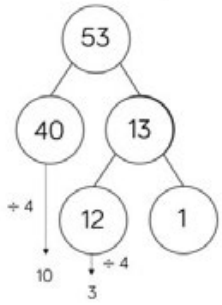
Flexible partitioning in a part-whole model supports this method.

Skill: Divide 2-digits by 1-digit (sharing with remainders)

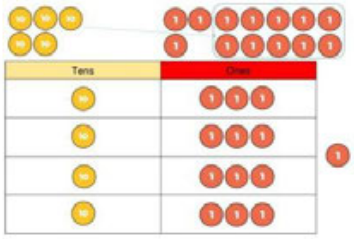
Year: 3/4







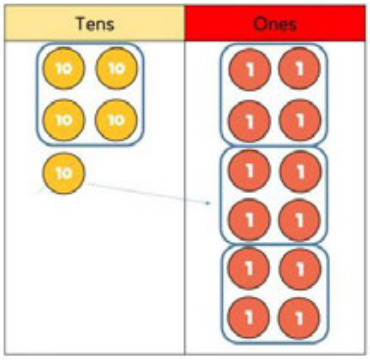
53 ÷ 4 = 13 r1

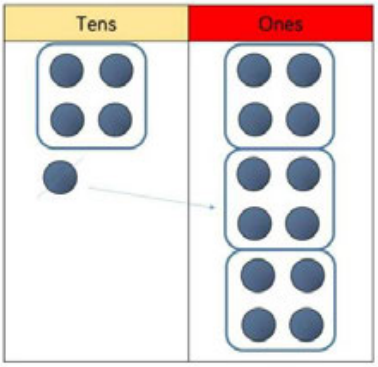


When dividing numbers with remainders, children can use Base 10 and place value counters to exchange one ten for ten ones.
Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made.
Flexible partitioning in a part-whole model supports this method.

Skill: Divide 2-digits by 1-digit (grouping)

Year: 4/5





52 ÷ 4 = 13

When using the short division method, children use grouping. Starting with the largest place value, they group by the divisor.

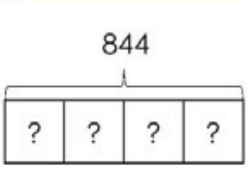
Language is important here. Children should consider 'How many groups of 4 tens can we make?' and 'How many groups of 4 ones can we make?'

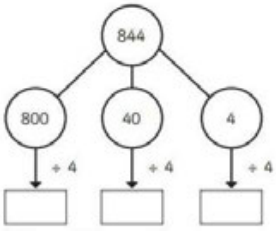
Remainders can also be seen as they are left ungrouped.

Skill: Divide 3-digits by 1-digit (sharing)

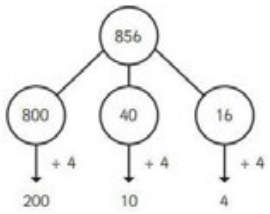
Year: 4

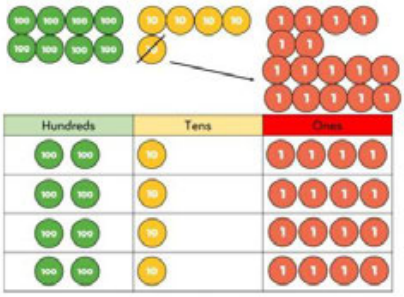
844 ÷ 4 = 211





844 ÷ 4 = 211

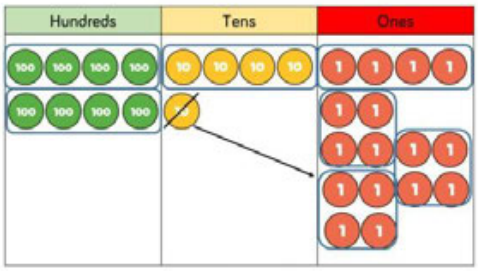




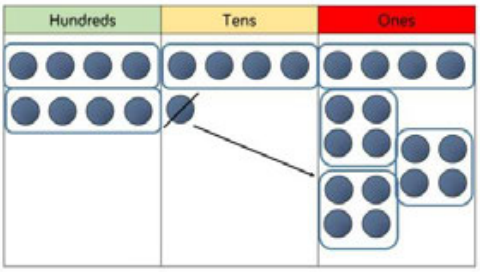
Children can continue to use place value counters to share 3-digit numbers into equal groups. Children should start with the equipment outside the place value grid before sharing the hundreds, tens and ones equally between the rows. This method can also help to highlight remainders. Flexible partitioning in a part-whole model supports this method.

Skill: Divide 3-digits by 1-digit (grouping)

Year: 5



		2	1	4
	4	8	5	$^{1}6$



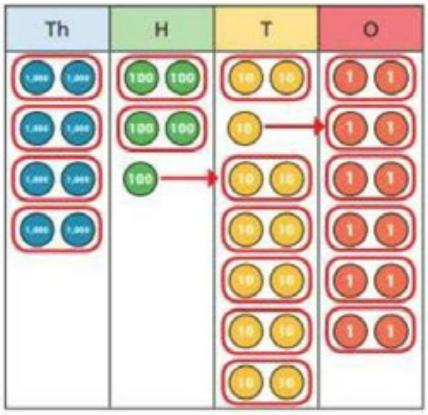
856 ÷ 4 = 214

Children can continue to use grouping to support their understanding of short division when dividing a 3-digit number by a 1-digit number.

Place value counters or plain counters can be used on a place value grid to support this understanding. Children can also draw their own counters and group them through a more pictorial method.

Skill: Divide 4-digits by 1-digit (grouping)

Year: 5



	4	2	6	6
2	8	5	$^{1}3$	$^{1}2$

8,532 ÷ 2 = 4,266

Place value counters or plain counters can be used on a place value grid to support children to divide 4-digits by 1-digit. Children can also draw their own counters and group them through a more pictorial method.

Children should be encouraged to move away from the concrete and pictorial when dividing numbers with multiple exchanges.

Skill: Divide multi digits by 2-digits (short division)

Year: 6

		0	3	6
	12	4	$^{4}3$	$^{7}2$

432 ÷ 12 = 36

7,335 ÷ 15 = 489

	0	4	8	9
15	7	$^{7}3$	$^{13}3$	$^{13}5$

15	30	45	60	75	90	105	120	135	150

When children begin to divide up to 4-digits by 2-digits, written methods become the most accurate as concrete and pictorial representations become less effective. Children can write out multiples to support their calculations with larger remainders. Children will also solve problems with remainders where the quotient can be rounded as appropriate.

Skill: Divide multi-digits by 2-digits (long division)	Year: 6

		0	3	6
1	2	4	3	2
	–	3	6	0
			7	2
	–		7	2
				0

(×30)

(×6)

$12 \times 1 = 12$
$12 \times 2 = 24$
$12 \times 3 = 36$
$12 \times 4 = 48$
$12 \times 5 = 60$
$12 \times 6 = 72$
$12 \times 7 = 84$
$12 \times 8 = 96$
$12 \times 7 = 108$
$12 \times 10 = 120$

$432 \div 12 = 36$

Children can also divide by 2-digit numbers using long division.

Children can write out multiples to support their calculations with larger remainders.

Children will also solve problems with remainders where the quotient can be rounded as appropriate.

$7{,}335 \div 15 = 489$

	0	4	8	9	
15	7	3	3	5	
–	6	0	0	0	(×400
	1	3	3	5	
–	1	2	0	0	(×80)
		1	3	5	
–		1	3	5	(×9)
				0	

$1 \times 15 = 15$
$2 \times 15 = 30$
$3 \times 15 = 45$
$4 \times 15 = 60$
$5 \times 15 = 75$
$10 \times 15 = 150$

Skill: Divide multi digits by 2-digits (long division)	Year: 6

$372 \div 15 = 24\ r12$

			2	4	r	1	2
1	5	3	7	2			
	–	3	0	0			
			7	2			
	–		6	0			
			1	2			

$1 \times 15 = 15$
$2 \times 15 = 30$
$3 \times 15 = 45$
$4 \times 15 = 60$
$5 \times 15 = 75$
$10 \times 15 = 150$

When a remainder is left at the end of a calculation, children can either leave it as a remainder or convert it to a fraction. This will depend on the context of the question.

Children can also answer questions where the quotient needs to be rounded according to the context.

			2	4	$\frac{4}{5}$
1	5	3	7	2	
	–	3	0	0	
			7	2	
	–		6	0	
			1	2	

$372 \div 15 = 24\frac{4}{5}$

Glossary

Array – An ordered collection of counters, cubes or other item in rows and columns.

Commutative – Numbers can be multiplied in any order.

Dividend – In division, the number that is divided.

Divisor – In division, the number by which another is divided.

Exchange – Change a number or expression for another of an equal value.

Factor – A number that multiplies with another to make a product.

Multiplicand – In multiplication, a number to be multiplied by another.

Partitioning – Splitting a number into its component parts.

Product – The result of multiplying one number by another.

Quotient – The result of a division

Remainder – The amount left over after a division when the divisor is not a factor of the dividend.

Scaling – Enlarging or reducing a number by a given amount, called the scale factor