Broughton Community Schools

Maths – Calculation Policy

June 2023

This policy outlines what we do at Broughton Community School to teach calculation.

We support and extend children as needed, broadening, deepening and applying their calculation knowledge. For each year group, the children are taught the method that is outlined in the National Curriculum.

We understand that children learn at different rates and children will be supported through the use of concrete and pictorial resources.

We encourage children to use a range of vocabulary to support their understanding of the process used in calculating.

Children may use differing methods at their teacher's discretion, based on their level of understanding, as there is no benefit to using a method mechanically if the underlying conceptual understanding is missing.

Where appropriate, there will be repetition of methods in differing year groups. This is not an exhaustive list of what techniques can be used to support children in their learning; it is a starting point for planning age appropriate methods of calculation.

We encourage the recall of mental number facts, as the ability to calculate mentally, is an important part of mathematics.

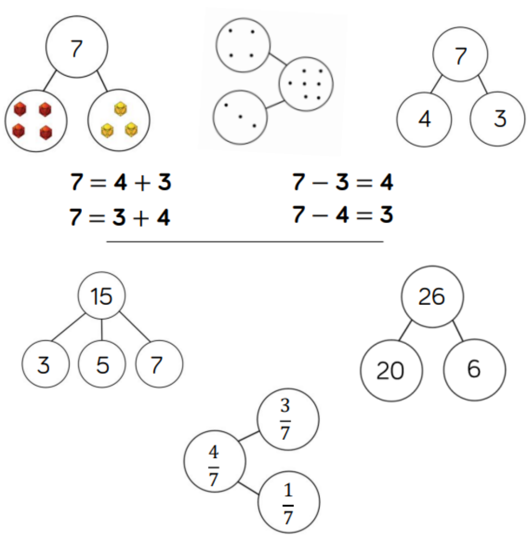
Written methods are complementary to mental methods and should not be seen as separate from them.

As a long-term aim, children should be able to choose an efficient mental or written method that is appropriate to a given task.

Supplementary methods can also be found in the White Rose & Power Maths Calculation Policy

Guidance	EYFS	KS1	Year 3	Year 4	Year 5	Year 6
Addition	• Subitising • Combining two parts to make a whole: part whole model. • Starting at the bigger number and counting on- using cubes. • Regrouping to make numbers within 10 using the fives and tens frame.	• Adding three single digits. • Use of base 10 to combine two numbers • Use of dienes to add. • Introduction to column method	• Column method- regrouping. • Using place value counters (up to 3 digits).	• Column method- regrouping (up to 4 digits).	• Column method- regrouping. • Use of place value counters for adding decimals.	• Column method- regrouping. • Abstract methods. • Place value counters to be used for adding decimal numbers.
Subtraction	• Taking away ones. • Counting back. • Part whole model.	• Counting back. • Find the difference. • Part whole model. • Make 10 using a tens frame# • Use of base 10 • Use of dienes to subtract • Introduction to column method	• Column method with regrouping (up to 3 digits using place value counters).	• Column method with regrouping (up to 3 digits using place value counters).	• Column method with regrouping. • Abstract for whole numbers. • Start with place value counters for decimals- with the same number of decimal places.	• Column method with regrouping. • Abstract methods. • Place value counters for decimals- with different amounts of decimal places.
Multiplication	• Recognising and making equal groups. • Doubling • Use cubes, Numicon and other objects in the classroom.	• Arrays- showing commutative multiplication • Fact families • Repeated addition • Counting in 2's, 5's and 10's	• Arrays • 2d × 1d using base 10	• Column multiplication- introduced with place value counters (2 and 3 digits multiplied by 1 digit).	• Column multiplication • Abstract only but if needed a repeat of year 4 first (up to 4-digit numbers multiplied by 1 or 2 digits)	• Column multiplication • Abstract methods (multi-digit up to 4 digits by a 2-digit number)
Division	• Sharing objects into groups • Division as grouping e.g. I have 6 sweets and I need to share by 2. • Grouping objects	• Division as grouping • Division within arrays- linking to multiplication • Repeated subtraction	• Division with a remainder-using lollipop sticks, times tables facts and repeated subtraction. • 2d divided by 1d using base 10 or place value counters.	• Division with a remainder • Short division (up to 3 digits by 1 digit- concrete and pictorial).	• Short division (up to 4 digits by a 1-digit number including remainders).	• Short division • Long division with place value counters (up to 4 digits by a 2-digit number) • Children should exchange into the tenths and hundredths column too

Benefits of using resources in maths



Benefits

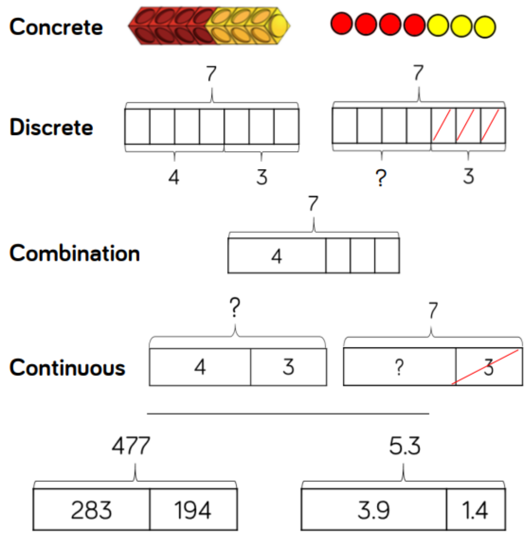
This part-whole model supports children in their understanding of aggregation and partitioning. Due to its shape, it can be referred to as a cherry part-whole model.

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.



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.

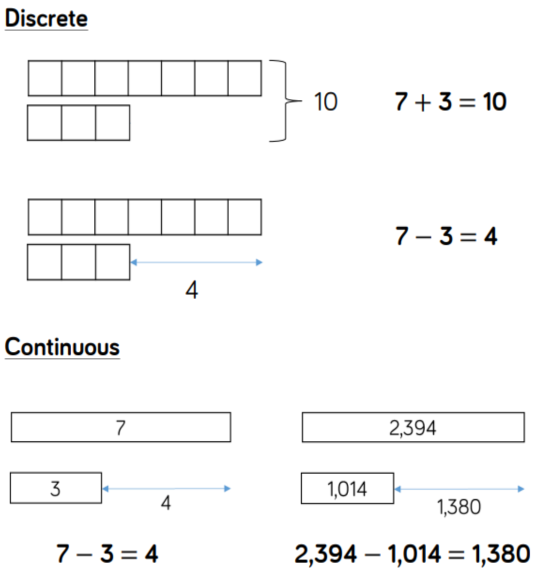
Cubes and counters can be used in a line as a concrete representation of the bar model.

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.



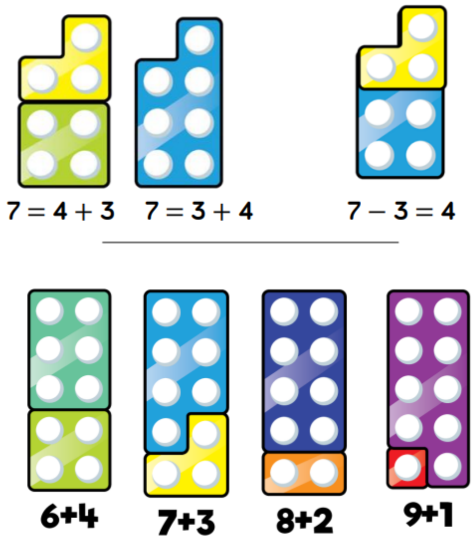
Benefits

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.



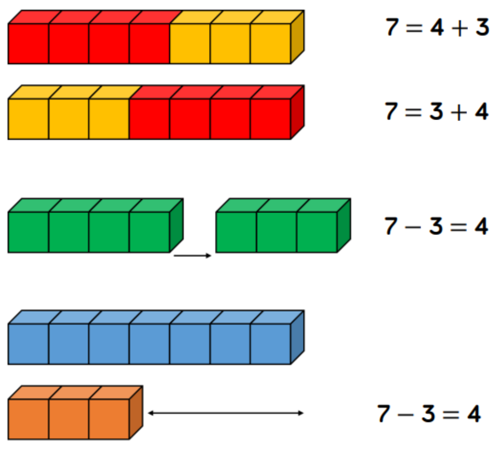
Benefits

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.



Benefits

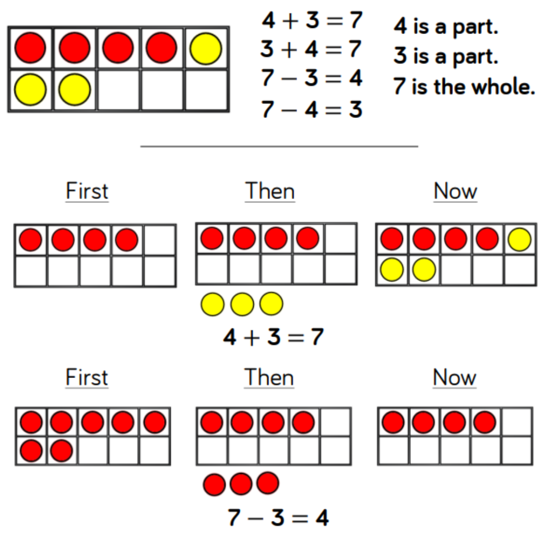
Cubes can be useful to support children with the addition and subtraction of one-digit numbers.

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.

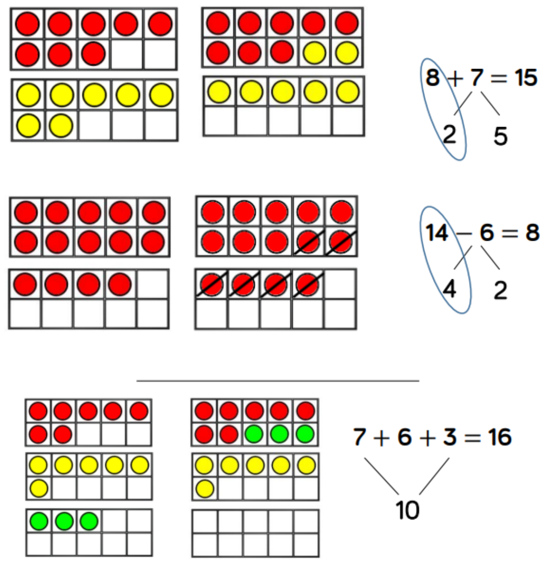


Benefits

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.

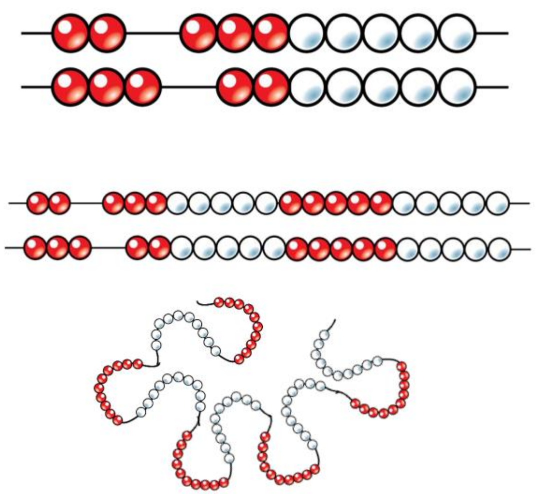


Benefits

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.



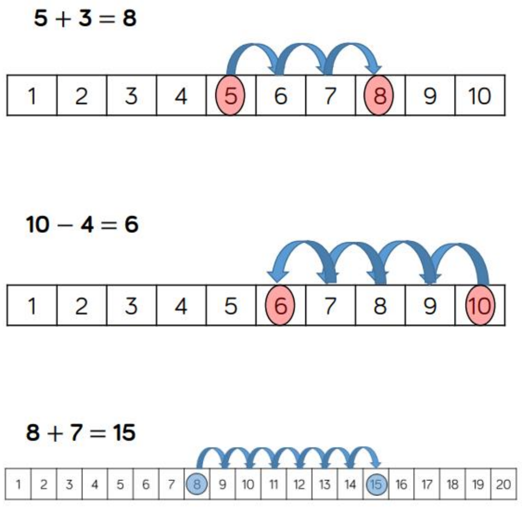
Benefits

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.



Benefits

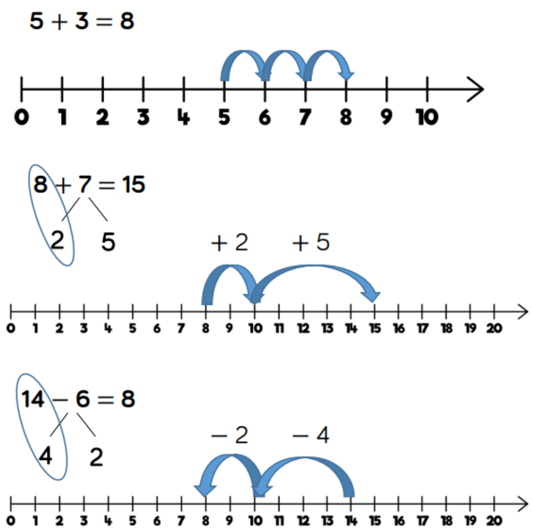
Number tracks are useful to support children in their understanding of augmentation and reduction.

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.



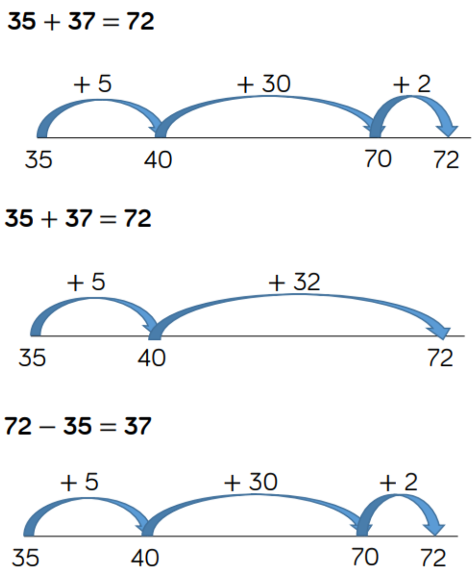
Benefits

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.



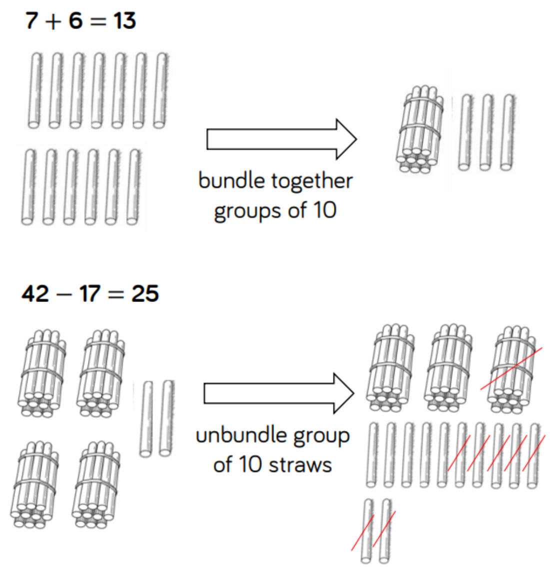
Benefits

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.



Benefits

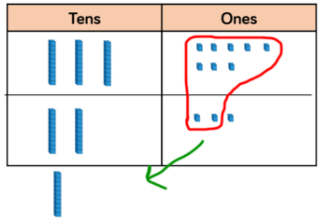
Straws are an effective way to support children in their understanding of exchange when adding and subtracting 2-digit numbers.

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.




```
  38
+ 23
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  61
  1
```
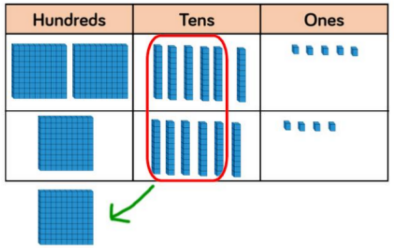



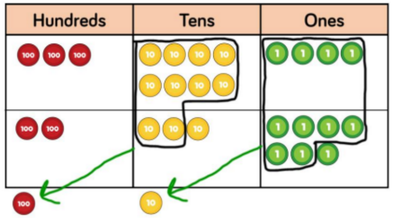

```
  265
+ 164
-----
  429
   1
```

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.




```
  384
+ 237
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  621
  1 1
```
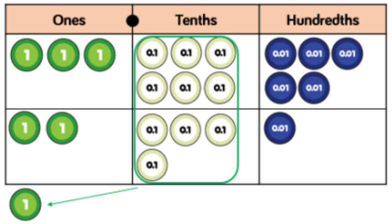



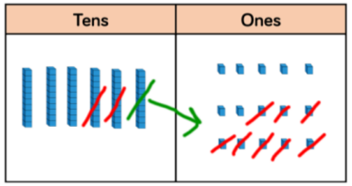

```
  3.65
+ 2.41
------
  6.06
  1
```

Benefits

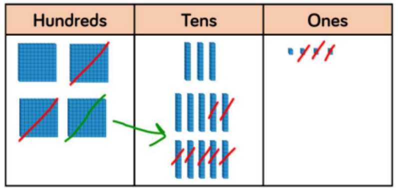
Using place value counters is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

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.




```
 5 1
  65
– 28
----
  37
```

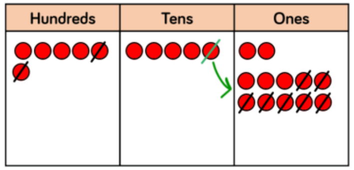



```
 3 1
  435
– 273
-----
  262
```

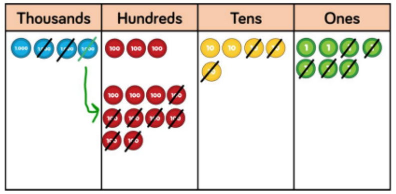
Benefits

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.




```
  4 1
  652
– 207
-----
  445
```




```
 3 1
  4357
– 2735
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  1622
```

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.

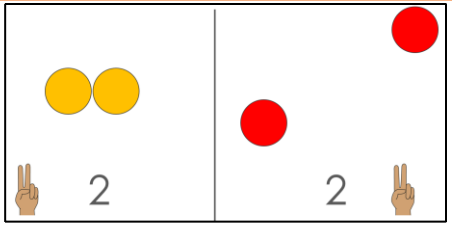
Children should first subtract without an exchange before moving on to subtraction with exchange. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

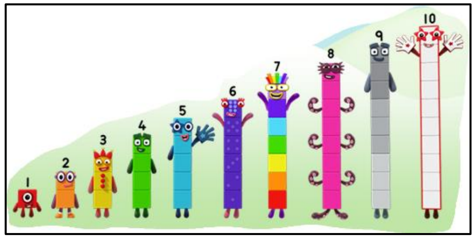
When building the model, children should just make the minuend using counters, they then subtract the subtrahend. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g.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

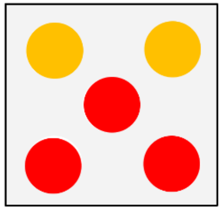
Addition

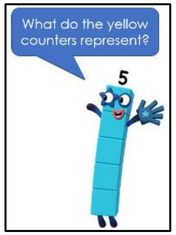
EYFS

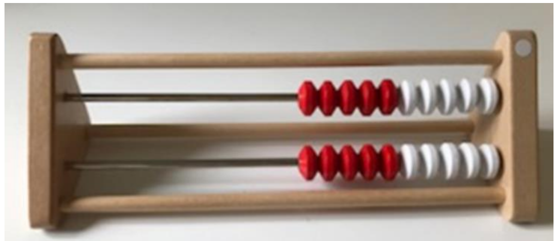
Children are encouraged to gain a sense of the number system through the use of counting concrete objects.

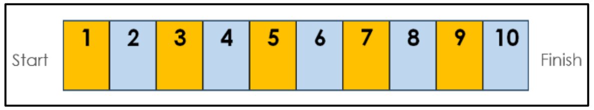


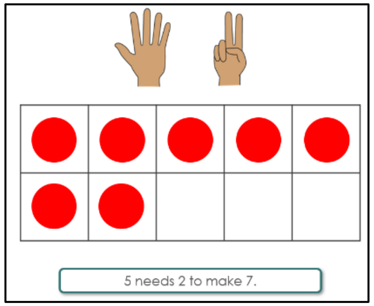


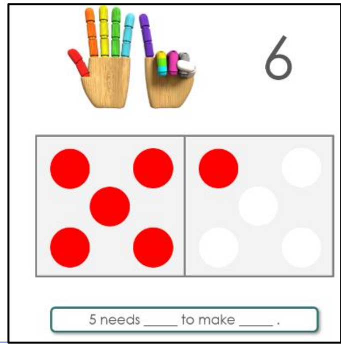










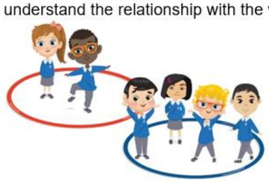


Year 1

Concrete

Counting and adding more
Children add one more person or object to a group to find one more.

Understanding part-part-whole relationship
Sort people and objects into parts and understand the relationship with the whole.



The parts are 2 and 4. The whole is 6.

Knowing and finding number bonds within 10
Break apart a group and put back together to find and form number bonds.

3 + 4 = 7

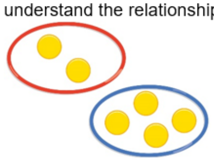
6 = 2 + 4

Pictorial

Counting and adding more
Children add one more cube or counter to a group to represent one more.

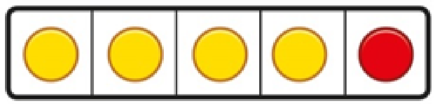
One more than 4 is 5.

Understanding part-part-whole relationship
Children draw to represent the parts and understand the relationship with the whole.



The parts are 1 and 5. The whole is 6.

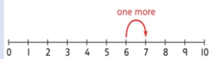
Knowing and finding number bonds within 10
Use five and ten frames to represent key number bonds.



5 = 4 + 1

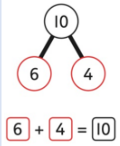
Abstract

Counting and adding more
Use a number line to understand how to link counting on with finding one more.



One more than 6 is 7.
7 is one more than 6.

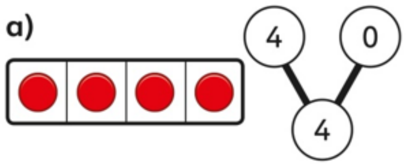
Understanding part-part-whole relationship
Use a part-whole model to represent numbers.



6 + 4 = 10

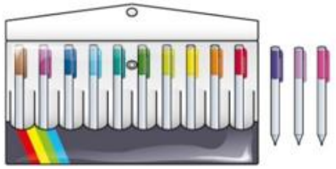
Knowing and finding number bonds within 10
Use a part-whole model alongside other representations to find number bonds. Make sure to include examples where one of the parts is zero.

a)



Understanding teen numbers as a complete 10 and some more

Complete a group of 10 objects and count more.



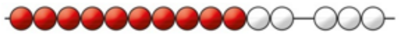
13 is 10 and 3 more.

Adding by counting on

Children use knowledge of counting to 20 to find a total by counting on using people or objects.

Adding the 1s

Children use bead strings to recognise how to add the 1s to find the total efficiently.



2 + 3 = 5
12 + 3 = 15

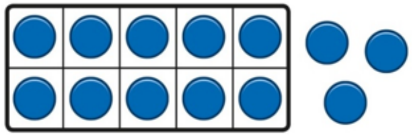
Bridging the 10 using number bonds

Children use a bead string to complete a 10 and understand how this relates to the addition.

7 add 3 makes 10.
So, 7 add 5 is 10 and 2 more.

Understanding teen numbers as a complete 10 and some more

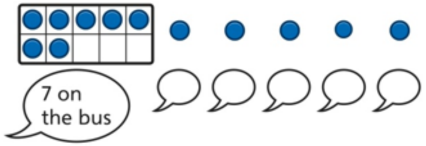
Use a ten frame to support understanding of a complete 10 for teen numbers.



13 is 10 and 3 more.

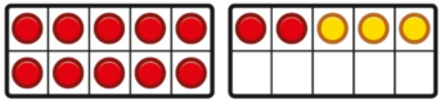
Adding by counting on

Children use counters to support and represent their counting on strategy.



Adding the 1s

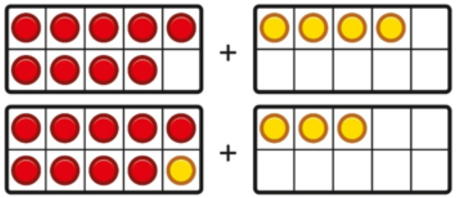
Children represent calculations using ten frames to add a teen and 1s.



2 + 3 = 5
12 + 3 = 15

Bridging the 10 using number bonds

Children use counters to complete a ten frame and understand how they can add using knowledge of number bonds to 10.

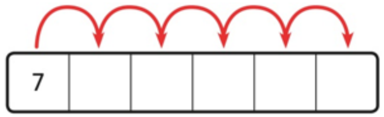


Understanding teen numbers as a complete 10 and some more.

1 ten and 3 ones equal 13.
10 + 3 = 13

Adding by counting on

Children use number lines or number tracks to support their counting on strategy.



7 + 5 = ☐

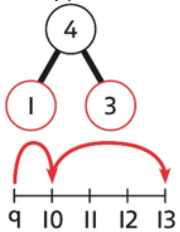
Adding the 1s

Children recognise that a teen is made from a 10 and some 1s and use their knowledge of addition within 10 to work efficiently.

3 + 5 = 8
So, 13 + 5 = 18

Bridging the 10 using number bonds

Use a part-whole model and a number line to support the calculation.

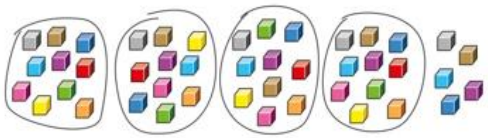


9 + 4 = 13

Year 2

Understanding tens and ones.

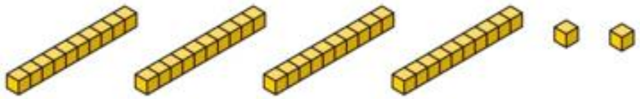
Group objects into 10s and 1s.

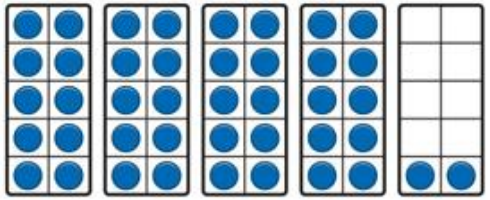


Bundle straws to understand unitising of 10s.

Understanding tens and ones.

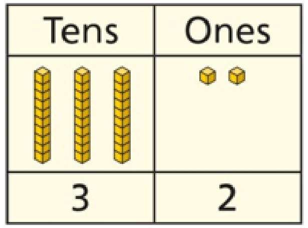
Understand 10s and 1s equipment, and link with visual representations on ten frames.





Understanding tens and ones.

Represent numbers on a place value grid, using equipment or numerals.



Tens	Ones
4	3

Adding tens

Use known bonds and unitising to add 10s.

I know that 4 + 3 = 7.
So, I know that 4 tens add 3 tens is 7 tens.

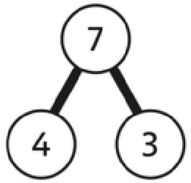
Adding tens

Use known bonds and unitising to add 10s.

I know that 4 + 3 = 7.
So, I know that 4 tens add 3 tens is 7 tens.

Adding tens

Use known bonds and unitising to add 10s.

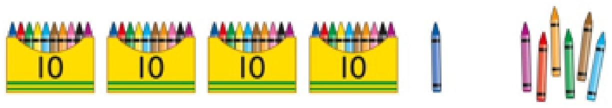


4 + 3 = ☐

4 + 3 = 7
4 tens + 3 tens = 7 tens
40 + 30 = 70

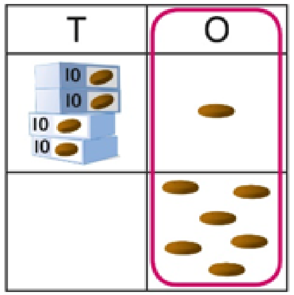
Adding a 1-digit number to a 2-digit number not bridging a 10

Add the 1s to find the total. Use known bonds within 10.



41 is 4 tens and 1 one.
41 add 6 ones is 4 tens and 7 ones.

This can also be done in a place value grid.



Adding a 1-digit number to a 2-digit number bridging 10

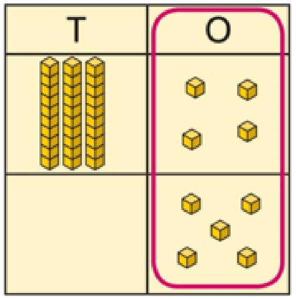
Complete a 10 using number bonds.

There are 4 tens and 5 ones.
I need to add 7. I will use 5 to complete a 10, then add 2 more.

Adding a 1-digit number to a 2-digit number not bridging a 10

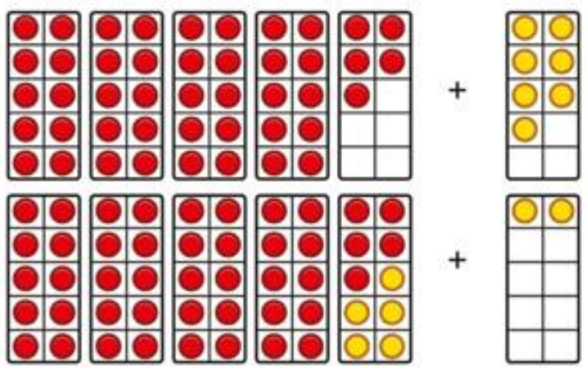
Add the 1s.

34 is 3 tens and 4 ones.
4 ones and 5 ones are 9 ones.
The total is 3 tens and 9 ones.



Adding a 1-digit number to a 2-digit number bridging 10

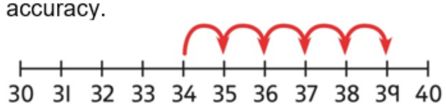
Complete a 10 using number bonds.



Adding a 1-digit number to a 2-digit number not bridging a 10

Add the 1s.

Understand the link between counting on and using known number facts. Children should be encouraged to use known number bonds to improve efficiency and accuracy.



This can be represented horizontally or vertically.

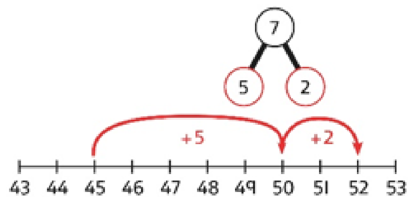
34 + 5 = 39

or

	T	O
	3	4
+		5
		9

Adding a 1-digit number to a 2-digit number bridging 10

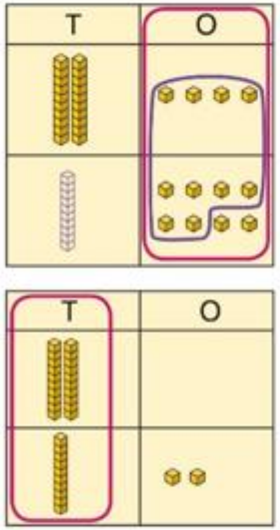
Complete a 10 using number bonds.



7 = 5 + 2
45 + 5 + 2 = 52

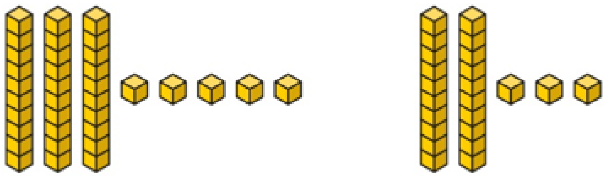
Adding a 1-digit number to a 2-digit number using exchange

Exchange 10 ones for 1 ten.



Adding two 2-digit numbers

Add the 10s and 1s separately.



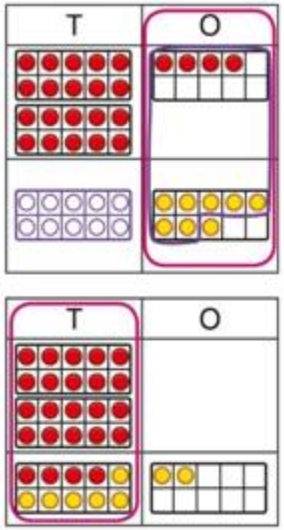
5 + 3 = 8
There are 8 ones in total.

3 + 2 = 5
There are 5 tens in total.

35 + 23 = 58

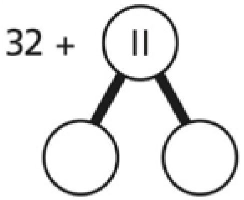
Adding a 1-digit number to a 2-digit number using exchange

Exchange 10 ones for 1 ten.



Adding two 2-digit numbers

Add the 10s and 1s separately. Use a part-whole model to support.

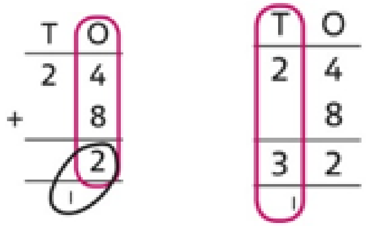


11 = 10 + 1
32 + 10 = 42
42 + 1 = 43

32 + 11 = 43

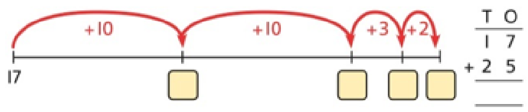
Adding a 1-digit number to a 2-digit number using exchange

Exchange 10 ones for 1 ten.

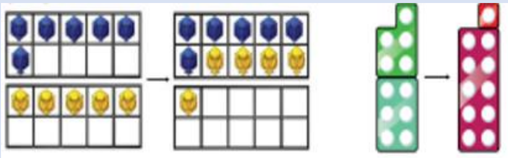
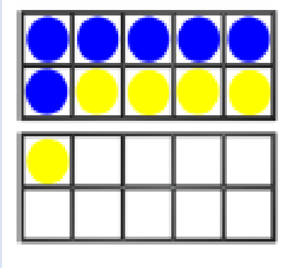
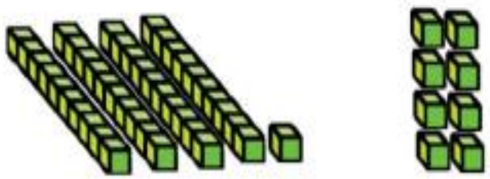
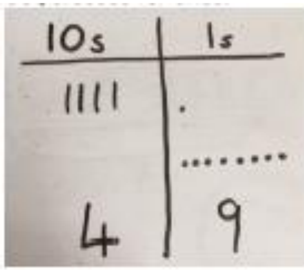
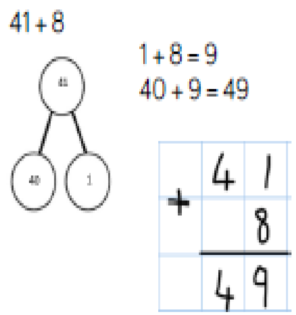
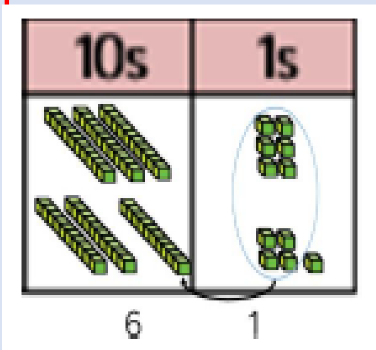
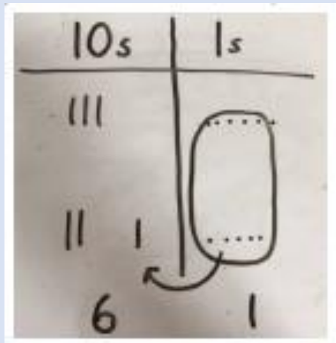
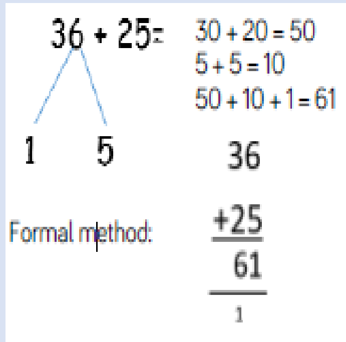


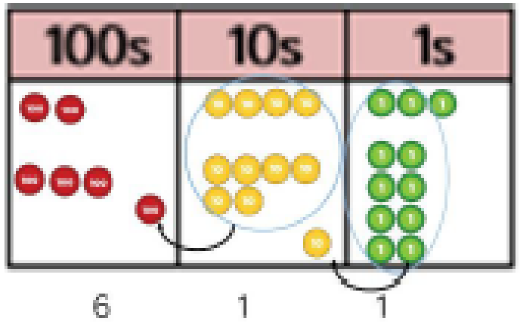
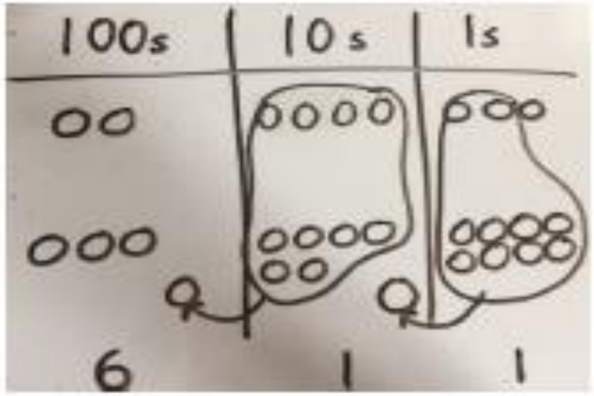
Adding two 2-digit numbers

Add the 10s and the 1s separately, bridging 10s where required. A number line can support the calculations.



17 + 25

Year 3	**Regrouping to make 10; using ten frames, counters/cubes or Numicon.** 	**Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.** 	**Children to develop an understanding of equality e.g.** **6 + □ = 11** **6 + 5 = 5 + □** **6 + 5 = □ + 4** $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$
Year 4	**TO + O using base 10. Continue to develop understanding of partitioning and place value.** **41 + 8** 	**Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.** 	**Part whole model moving onto efficient method of calculation.** 
Year 5	**TO + TO using base 10. Continue to develop understanding of partitioning and place value.** **36 + 25** 	**Children to represent the base 10 in a place value chart.** 	**Looking for ways to make 10.** 

Year 6	**Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.**  	**Children to represent the counters in a place value chart, circling when they make an exchange.**  	**Efficient method with exchanges.** 243 +368 611 1 1

Subtraction

EYFS

Children are encouraged to gain a sense of the number system through the use of counting concrete objects.

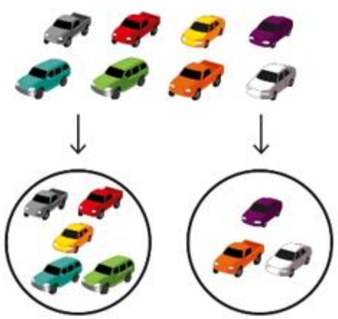
Year 1

Concrete

Counting back and taking away
Children arrange objects and remove to find how many are left.

1 less than 6 is 5.
6 subtract 1 is 5.

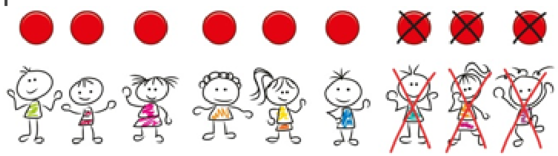
Finding a missing part, given a whole and a part
Children separate a whole into parts and understand how one part can be found by subtraction.



8 − 5 = ?

Pictorial

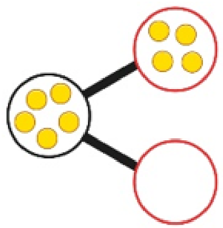
Counting back and taking away
Children draw and cross out or use counters to represent objects from a problem.



9 − □ = □

There are □ children left.

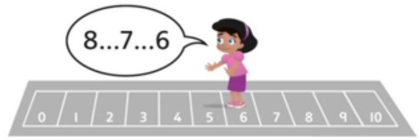
Finding a missing part, given a whole and a part
Children represent a whole and a part and understand how to find the missing part by subtraction.



5 − 4 = □

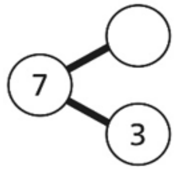
Abstract

Counting back and taking away
Children count back to take away and use a number line or number track to support the method.



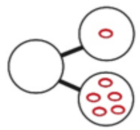
9 − 3 = 6

Finding a missing part, given a whole and a part
Children use a part-whole model to support the subtraction to find a missing part.



7 − 3 = ?

Children develop an understanding of the relationship between addition and subtraction facts in a part-whole model.



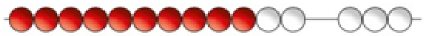
□ − □ = □
□ − □ = □
□ + □ = □
□ + □ = □

Finding the difference
Arrange two groups so that the difference between the groups can be worked out.

8 is 2 more than 6.
6 is 2 less than 8.
The difference between 8 and 6 is 2.

Subtraction within 20
Understand when and how to subtract 1s efficiently.

Use a bead string to subtract 1s efficiently.



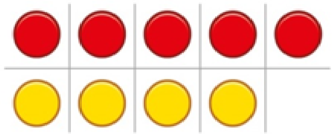
5 − 3 = 2
15 − 3 = 12

Subtracting 10s and 1s
For example: 18 − 12

Subtract 12 by first subtracting the 10, then the remaining 2.

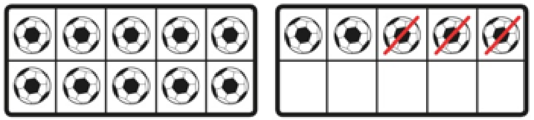
First subtract the 10, then take away 2.

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



5 − 4 = 1
The difference between 5 and 4 is 1.

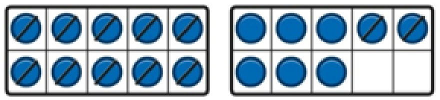
Subtraction within 20
Understand when and how to subtract 1s efficiently.



5 − 3 = 2
15 − 3 = 12

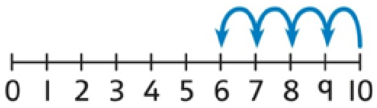
Subtracting 10s and 1s
For example: 18 − 12

Use ten frames to represent the efficient method of subtracting 12.



First subtract the 10, then subtract 2.

Finding the difference
Children understand ‘find the difference’ as subtraction.

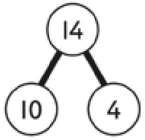


10 − 4 = 6
The difference between 10 and 6 is 4.

Subtraction within 20
Understand how to use knowledge of bonds within 10 to subtract efficiently.

5 − 3 = 2
15 − 3 = 12

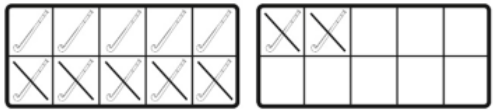
Subtracting 10s and 1s
Use a part-whole model to support the calculation.



19 − 14
19 − 10 = 9
9 − 4 = 5
So, 19 − 14 = 5

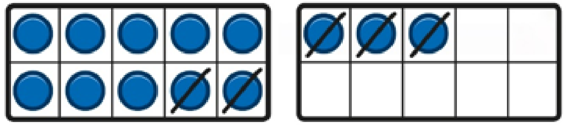
Subtraction bridging 10 using number bonds
For example: 12 − 7

Arrange objects into a 10 and some 1s, then decide on how to split the 7 into parts.



7 is 2 and 5, so I take away the 2 and then the 5.

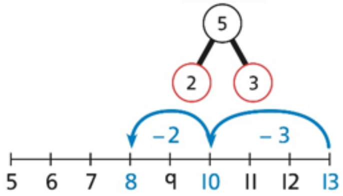
Subtraction bridging 10 using number bonds
Represent the use of bonds using ten frames.



For 13 – 5, I take away 3 to make 10, then take away 2 to make 8.

Subtraction bridging 10 using number bonds
Use a number line and a part-whole model to support the method.

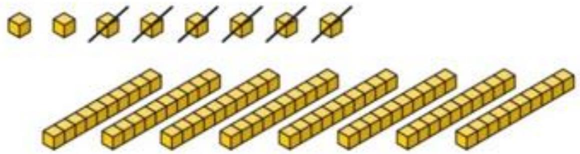
13 − 5



Year 2

Subtracting multiples of 10

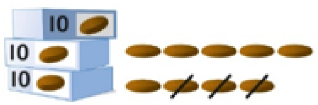
Use known number bonds and unitising to subtract multiples of 10.

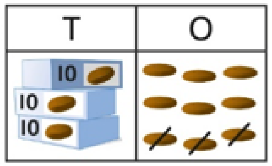


8 subtract 6 is 2.
So, 8 tens subtract 6 tens is 2 tens.

Subtracting a single-digit number

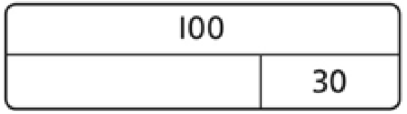
Subtract the 1s. This may be done in or out of a place value grid.





Subtracting multiples of 10

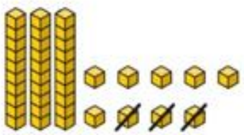
Use known number bonds and unitising to subtract multiples of 10.

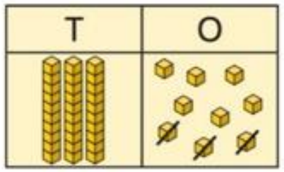


10 − 3 = 7
So, 10 tens subtract 3 tens is 7 tens.

Subtracting a single-digit number

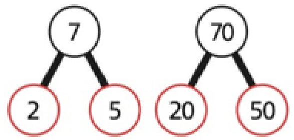
Subtract the 1s. This may be done in or out of a place value grid.





Subtracting multiples of 10

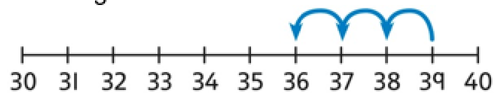
Use known number bonds and unitising to subtract multiples of 10.



7 tens subtract 5 tens is 2 tens.
70 − 50 = 20

Subtracting a single-digit number

Subtract the 1s. Understand the link between counting back and subtracting the 1s using known bonds.

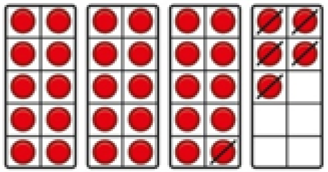


	T	O
	3	9
−		3
	3	6

9 − 3 = 6
39 − 3 = 36

Subtracting a single-digit number bridging 10

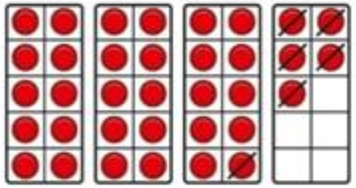
Bridge 10 by using known bonds.



35 − 6
I took away 5 counters, then 1 more.

Subtracting a single-digit number bridging 10

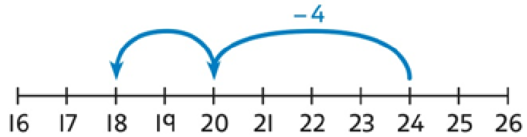
Bridge 10 by using known bonds.



35 − 6
First, I will subtract 5, then 1.

Subtracting a single-digit number bridging 10

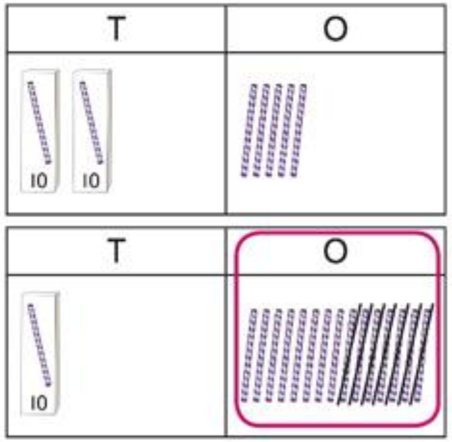
Bridge 10 by using known bonds.



24 − 6 = ?
24 − 4 − 2 = ?

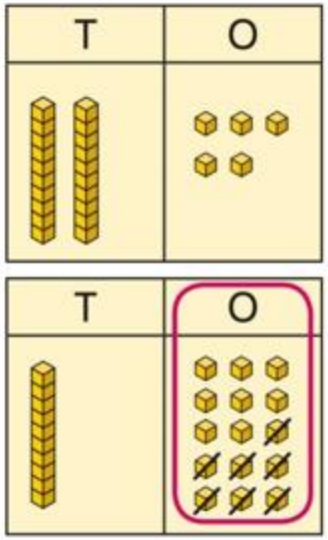
Subtracting a single-digit number using exchange

Exchange 1 ten for 10 ones. This may be done in or out of a place value grid.



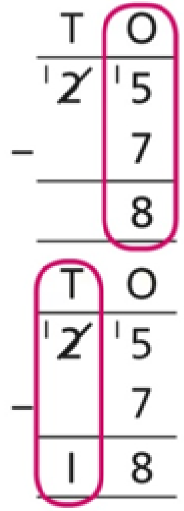
Subtracting a single-digit number using exchange

Exchange 1 ten for 10 ones.

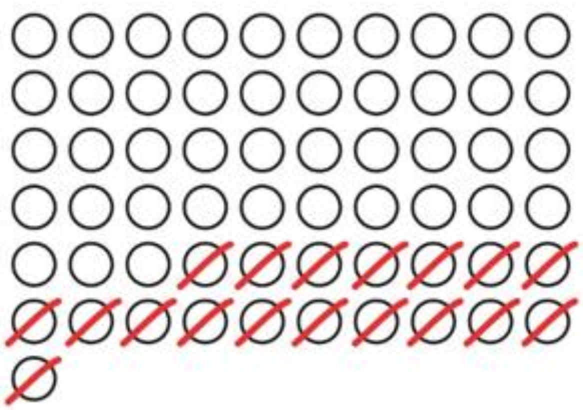
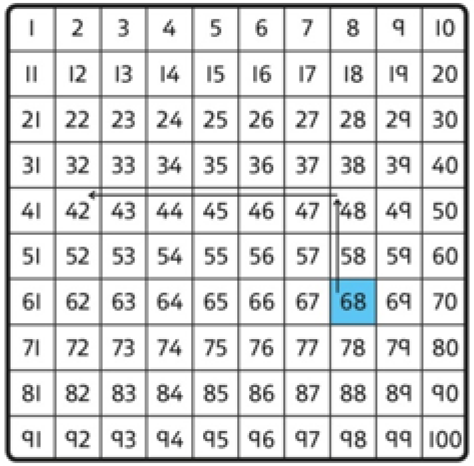
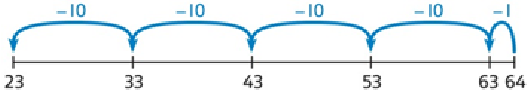
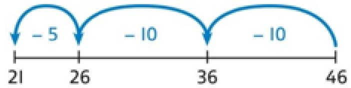
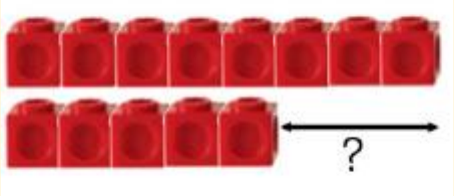
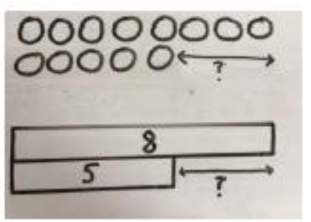
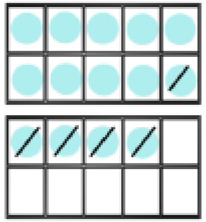
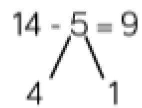


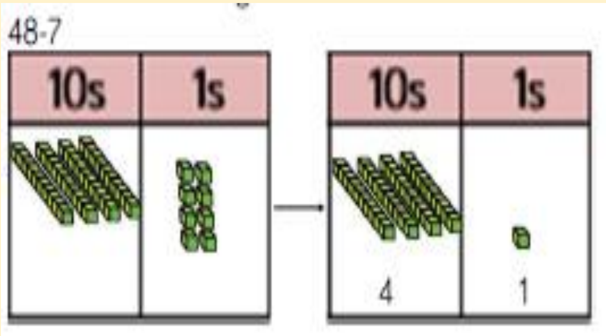
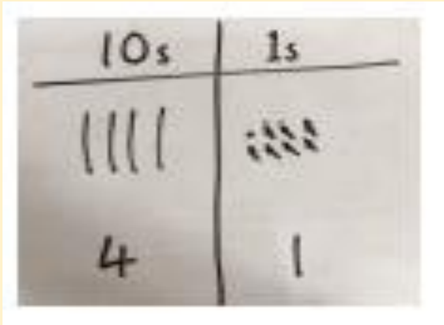
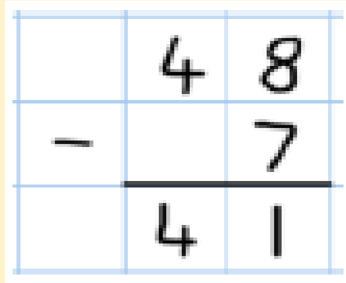
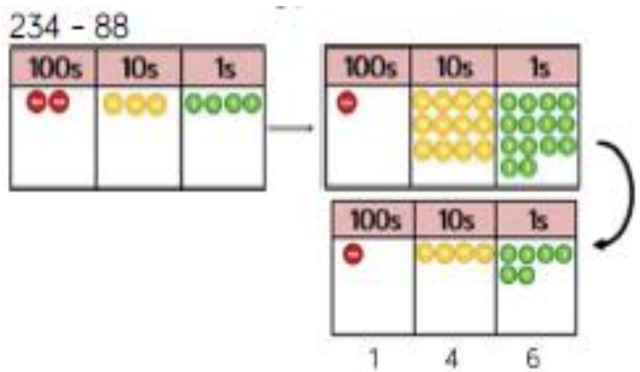
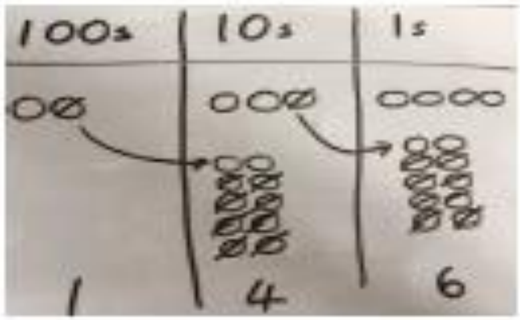
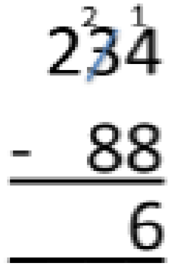
Subtracting a single-digit number using exchange

Exchange 1 ten for 10 ones.



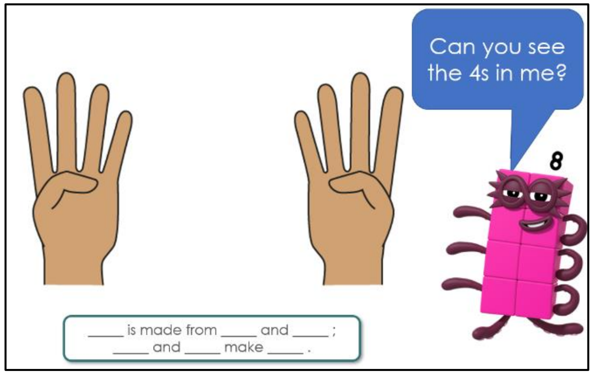
25 − 7 = 18

	Subtracting a 2-digit number Subtract by taking away.  *61 − 18* *I took away 1 ten and 8 ones.*	**Subtracting a 2-digit number** Subtract the 10s and the 1s. This can be represented on a 100 square. 	**Subtracting a 2-digit number** Subtract the 10s and the 1s. This can be represented on a number line.  *64 − 41 = ?* *64 − 1 = 63* *63 − 40 = 23* *64 − 41 = 23*  *46 − 20 = 26* *26 − 5 = 21* *46 − 25 = 21*
Year 3	**Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used).** Calculate the difference between 8 and 5. 	**Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.** 	**Find the difference between 8 & 5. Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.** 8 – 5, the difference is ☐ 9 - 6 = 8 - 5 = 7 - 4
Year 4	**Making 10 using ten frames.** **14-5=?** 	**Children to present the tens frame pictorially and discuss what they did to make 10.** 	**Children to show how they can make 10 by partitioning the subtrahend.**  14 - 4 = 10 10 - 1 = 9

Year 5	**Column method using base 10.** 	**Children to represent the base 10 pictorially.** 	**Column method or children could count back 7.** 
Year 6	**Column method using place value counters.** 	**Represent the place value counters pictorially; remembering to show what has been exchanged.** 	**Formal column method. Children must understand what has happened when they have crossed out digits.** 

Multiplication

EYFS



Children use concrete objects to make and count equal groups of objects.

Year 1

Concrete

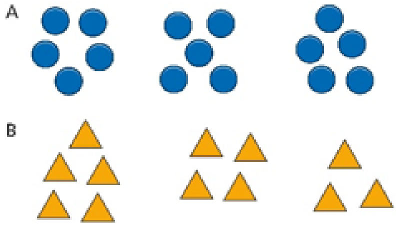
Recognising and making equal groups
Children arrange objects in equal and unequal groups and understand how to recognise whether they are equal.

Finding the total of equal groups by counting in 2s, 5s and 10s

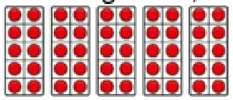
There are 5 pens in each pack …
5…10…15…20…25…30…35…40…

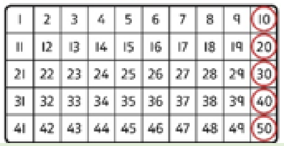
Pictorial

Recognising and making equal groups
Children draw and represent equal and unequal groups.



Finding the total of equal groups by counting in 2s, 5s and 10s
100 squares and ten frames support counting in 2s, 5s and 10s.



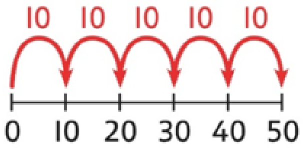


Abstract

Describe equal groups using words

Three equal groups of 4.
Four equal groups of 3.

Finding the total of equal groups by counting in 2s, 5s and 10s
Use a number line to support repeated addition through counting in 2s, 5s and 10s.



Year 2

Equal groups and repeated addition

Recognise equal groups and write as repeated addition and as multiplication.

3 groups of 5 chairs
15 chairs altogether

Using arrays to represent multiplication and support understanding

Understand the relationship between arrays, multiplication and repeated addition.

4 groups of 5

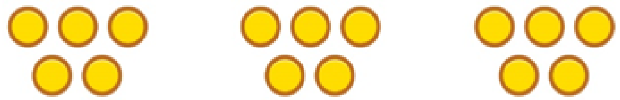
Understanding commutativity

Use arrays to visualise commutativity.

I can see 6 groups of 3.
I can see 3 groups of 6.

Equal groups and repeated addition

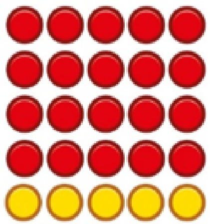
Recognise equal groups using standard objects such as counters and write as repeated addition and multiplication.



3 groups of 5
15 in total

Using arrays to represent multiplication and support understanding

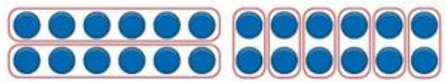
Understand the relationship between arrays, multiplication and repeated addition.



4 groups of 5 … 5 groups of 5

Understanding commutativity

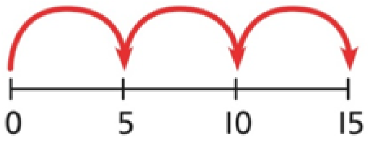
Form arrays using counters to visualise commutativity. Rotate the array to show that orientation does not change the multiplication.



This is 2 groups of 6 and also 6 groups of 2.

Equal groups and repeated addition

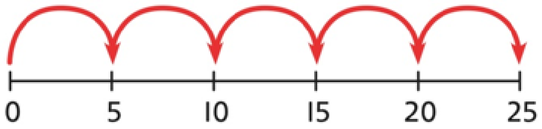
Use a number line and write as repeated addition and as multiplication.



5 + 5 + 5 = 15
3 × 5 = 15

Using arrays to represent multiplication and support understanding

Understand the relationship between arrays, multiplication and repeated addition.



5 × 5 = 25

Understanding commutativity

Use arrays to visualise commutativity.

4 + 4 + 4 + 4 + 4 = 20
5 + 5 + 5 + 5 = 20
4 × 5 = 20 and 5 × 4 = 20

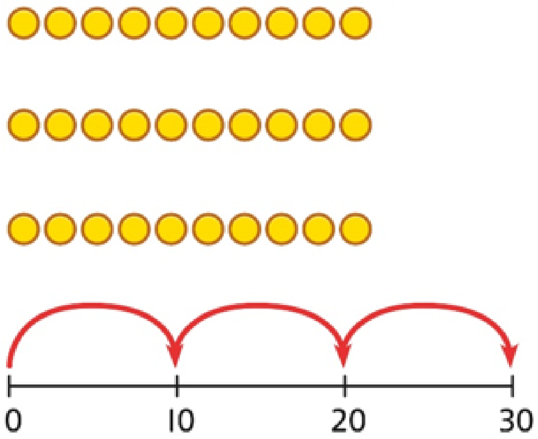
Learning ×2, ×5 and ×10 table facts

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

3 groups of 10 … 10, 20, 30
$3 \times 10 = 30$

Learning ×2, ×5 and ×10 table facts

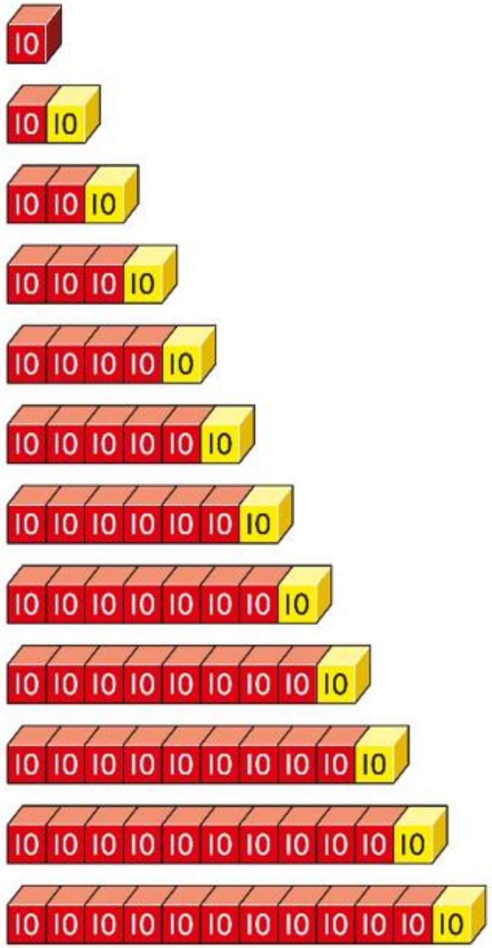
Understand how to relate counting in unitised groups and repeated addition with knowing key times-table facts.



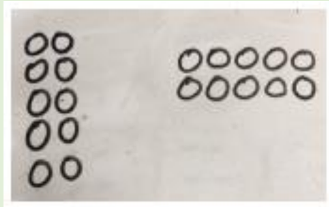
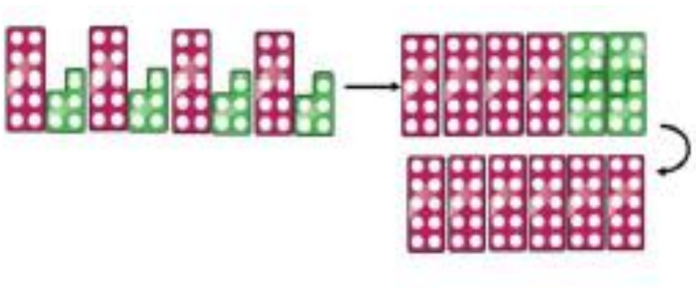
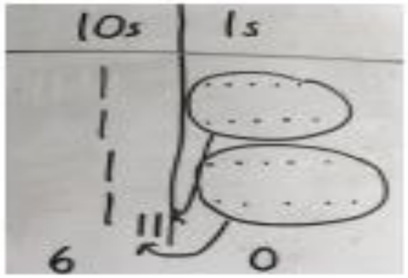
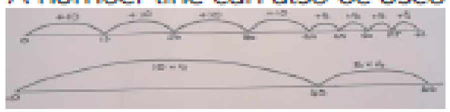
$10 + 10 + 10 = 30$
$3 \times 10 = 30$

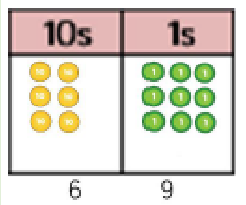
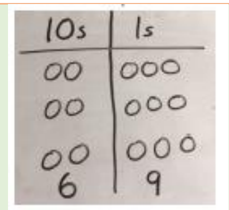
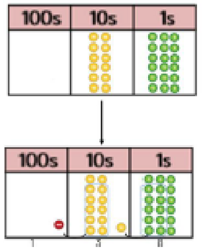
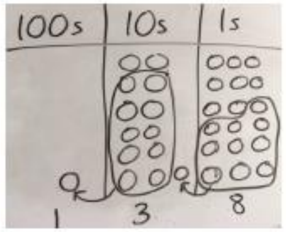
Learning ×2, ×5 and ×10 table facts

Understand how the times-tables increase and contain patterns.



$5 \times 10 = 50$
$6 \times 10 = 60$

Year 3	**Use arrays to illustrate commutativity counters and other objects can also be used.** **2 × 5 = 5 × 2** 	**Children to represent the arrays pictorially.** 	**Children to be able to use an array to write a range of calculations – as shown to the left.** 10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5
Year 4	**Partition to multiply using Numicon, base 10 or Cuisenaire rods.** **4 × 15** 	**Children to represent the concrete manipulatives pictorially.** 	**Children to be encouraged to show the steps they have taken.** 4 × 15 10 5 10 × 4 = 40 5 × 4 = 20 40 + 20 = 60 A number line can also be used 

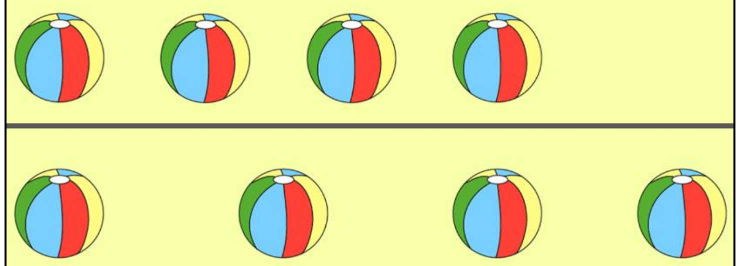
Year 5		Formal column method with place value counters (base 10 can also be used.) 3 × 23		Children to represent the counters pictorially.	3 × 23 20 3 3 × 20 = 60 3 × 3 = 9 60 + 9 = 69 23 × 3 69	Children to record what it is they are doing to show understanding.
Year 6		Formal column method with place value counters. 6 x 23		Children to represent the counters/base 10, pictorially e.g. the image below.	6 x 23 = 23 × 6 138 1 1	Formal written method.

Division

EYFS

Children use concrete objects to count and share equally into 2 groups

Equal or NOT equal?



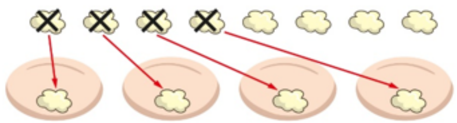
Year 1

Grouping
Learn to make equal groups from a whole and find how many equal groups of a certain size can be made.

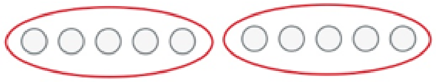
Sort a whole set people and objects into equal groups.

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

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

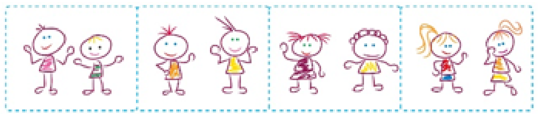


Grouping
Represent a whole and work out how many equal groups.

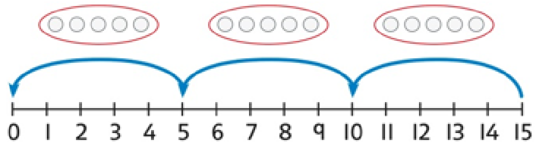


There are 10 in total.
There are 5 in each group.
There are 2 groups.

Sharing
Sketch or draw to represent sharing into equal parts. This may be related to fractions.



Grouping
Children may relate this to counting back in steps of 2, 5 or 10.

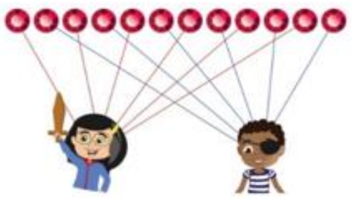


Sharing
10 shared into 2 equal groups gives 5 in each group.

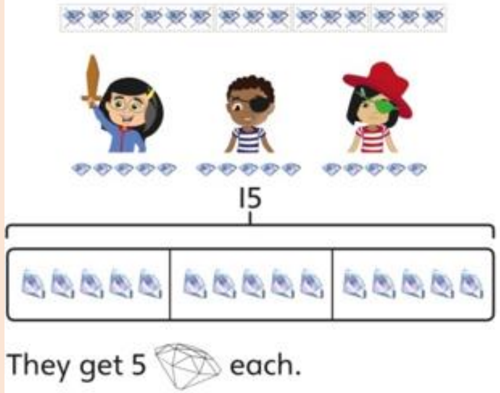
Year 2

Sharing equally

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



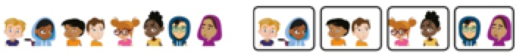
12 shared equally between 2.
They get 6 each.



15 shared equally between 3.
They get 5 each.

Grouping equally

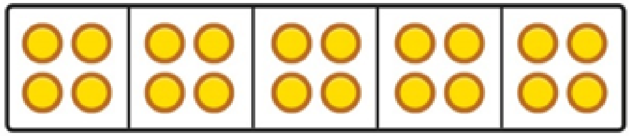
Understand how to make equal groups from a whole.



8 divided into 4 equal groups.
There are 2 in each group.

Sharing equally

Represent the objects shared into equal parts using a bar model.

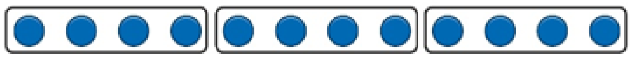


20 shared into 5 equal parts.
There are 4 in each part.

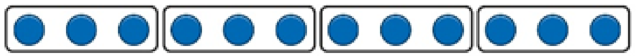
Grouping equally

Understand the relationship between grouping and the division statements.

12 ÷ 3 = 4

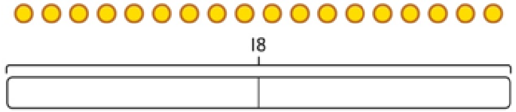


12 ÷ 4 = 3



Sharing equally

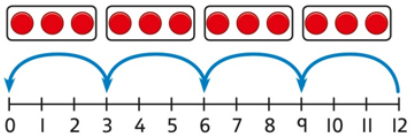
Use a bar model to support understanding of the division.



18 ÷ 2 = 9

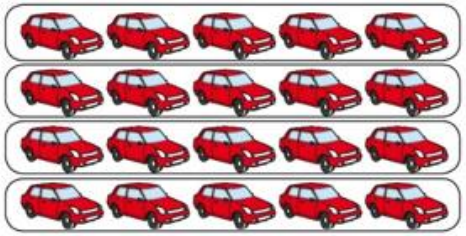
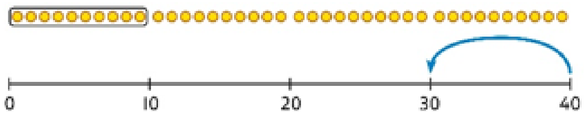
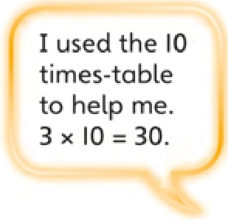
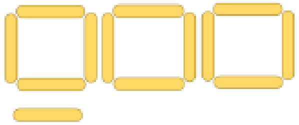
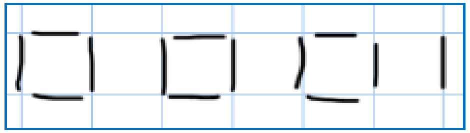
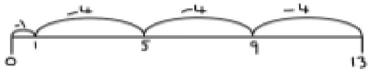
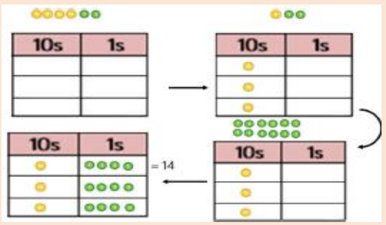
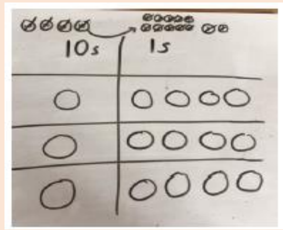
Grouping equally

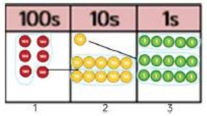
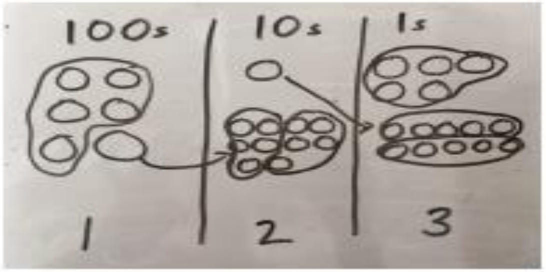
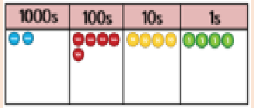
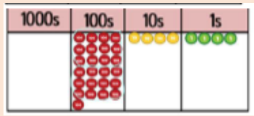
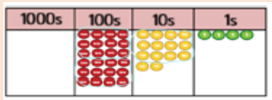
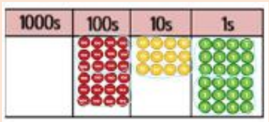
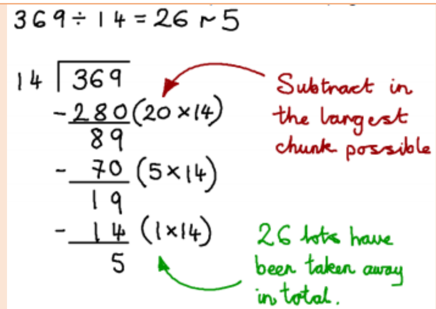
Understand how to relate division by grouping to repeated subtraction.



There are 4 groups now.

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

	Using known times-tables to solve divisions Understand the relationship between multiplication facts and division.  *4 groups of 5 cars is 20 cars in total.* *20 divided by 4 is 5.*	**Using known times-tables to solve divisions** Link equal grouping with repeated subtraction and known times-table facts to support division.  *40 divided by 4 is 10.* Use a bar model to support understanding of the link between times-table knowledge and division.	**Using known times-tables to solve divisions** Relate times-table knowledge directly to division. 1 × 10 = 10 2 × 10 = 20 3 × 10 = 30 4 × 10 = 40 5 × 10 = 50 6 × 10 = 60 7 × 10 = 70 8 × 10 = 80  *I know that 3 groups of 10 makes 30, so I know that 30 divided by 10 is 3.* *3 × 10 = 30 so 30 ÷ 10 = 3*
Year 3	**2 ÷ 1 with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used.**  **13 ÷ 4** **Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.** **There are 3 whole squares, with 1 left over.**	**Children to represent the lollipop sticks pictorially.** **There are 3 whole squares, with 1 left over.** 	**Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. '3 groups of 4, with 1 left over'**  13 ÷ 4 - 3 remainder 1
Year 4	**Sharing using place value counters.** **42 ÷ 3 = 14**  	**Children to represent the place value counters pictorially.**  	**Children to be able to make sense of the place value counters and write calculations to show the process.** 42 ÷ 3 42 = 30 + 12 30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14

Year 5	**Short division using place value counters to group.** **615 ÷ 5**  1. Make 615 with place value counters. 2. How many groups of 5 hundred can you make with 6 hundred counters? 3. Exchange 1 hundred for 10 tens. 4. How many groups of 5 tens can you make with 11 ten counters? 5. Exchange 1 ten for 10 ones. 6. How many groups of 5 ones can you make with 15 ones?	**Represent the place value counters pictorially.**  	**Children to the calculation using the short division scaffold.** $$\begin{array}{r} 123 \\ 5\overline{)6^{1}1^{1}5} \end{array}$$
Year 6	 We can't group 2 thousands into groups of 12 so will exchange them.  We can group 24 hundreds into groups of 12 which leaves with 1 hundred. $$\begin{array}{r} 0\,2 \\ 12\overline{)2544} \\ \underline{24} \\ 1 \end{array}$$  After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens. $$\begin{array}{r} 0\,2\,1 \\ 12\overline{)2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 2 \end{array}$$  After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder. $$\begin{array}{r} 0\,2\,1\,2 \\ 12\overline{)2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 24 \\ \underline{24} \\ 0 \end{array}$$	 	**Formal long division method – no chunking.**