#### **KEY STAGE 1**

Children develop the core ideas that underpin all calculation. They begin by connecting calculation with counting on and counting back, but they should learn that understanding wholes and parts will enable them to calculate efficiently and accurately, and with greater flexibility. They learn how to use an understanding of 10s and 1s to develop their calculation strategies, especially in addition and subtraction.

**Key language:** whole, part, ones, ten, tens, number bond, add, addition, plus, total, altogether, subtract, subtraction, find the difference, take away, minus, less, more, group, share, equal, equals, is equal to, groups, equal groups, times, multiplied by, divide, share, shared equally, times-table

Addition and subtraction: Children first learn to connect addition and subtraction with counting, but they soon develop two very important skills: an understanding of parts and wholes, and an understanding of unitising 10s, to develop efficient and effective calculation strategies based on known number bonds and an increasing awareness of place value. Addition and subtraction are taught in a way that is interlinked to highlight the link between the two operations. A key idea is that children will select methods and approaches based on their number sense. For example, in Year 1, when faced with 15 - 3 and 15 - 13, they will adapt their ways of approaching the calculation appropriately. The teaching should always emphasise the importance of mathematical thinking to ensure accuracy and flexibility of approach, and the importance of using known number facts to harness their recall of bonds within 20 to support both addition and subtraction methods.

In Year 2, they will start to see calculations presented in a column format, although this is not expected to be formalised until KS2. We show the column method in Year 2 as an option; teachers may not wish to include it until Year 3.

**Multiplication and division:** Children develop an awareness of equal groups and link this with counting in equal steps, starting with 2s, 5s and 10s. In Year 2, they learn to connect the language of equal groups with the mathematical symbols for multiplication and division.

They learn how multiplication and division can be related to repeated addition and repeated subtraction to find the answer to the calculation. In this key stage, it is vital that children explore and experience a variety of strong images and manipulative representations of equal groups, including concrete experiences as well as abstract calculations.

Children begin to recall some key multiplication facts, including doubles, and an understanding of the 2, 5 and 10 times-tables and how they are related to counting.

**Fractions:** In Year 1, children encounter halves and quarters, and link this with their understanding of sharing. They experience key spatial representations of these fractions, and learn to recognise examples and non-examples, based on their awareness of equal parts of a whole. In Year 2, they develop an awareness of unit fractions and experience non-unit fractions, and they learn to write them and read them in the common format of numerator and denominator.

		Year 1	
	Concrete	Pictorial	Abstract
Year 1 Addition	Counting and adding more Children add one more person or object to a group to find one more.	Counting and adding more Children add one more cube or counter to a group to represent one more.	Counting and adding more Use a number line to understand how to link counting on with finding one more.
		00000	one more 0 1 2 3 4 5 6 7 8 9 10
		One more than 4 is 5.	One more than 6 is 7. 7 is one more than 6.
			Learn to link counting on with adding more than one.
			0   2   3   4   5   6   7   8   9   10   5 + 3 = 8
	Understanding part-part-whole relationship Sort people and objects into parts and understand the relationship with the whole.	Understanding part-part-whole relationship Children draw to represent the parts and understand the relationship with the whole.	Understanding part-part-whole relationship Use a part-whole model to represent the numbers.
			6 4
		The parts are 1 and 5. The whole is 6.	6 + 4 = 10 6 + 4 = 10
	The parts are 2 and 4. The whole is 6.	16. 1. 16. 11. 1. 1. 1.	1
	Knowing and finding number bonds within 10	Knowing and finding number bonds within 10	Knowing and finding number bonds within 10

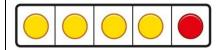
Break apart a group and put back together to find and form number bonds.

3 + 4 = 7

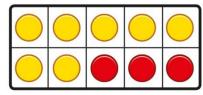


6 = 2 + 4

Use five and ten frames to represent key number bonds.

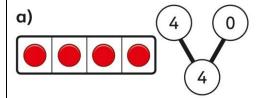


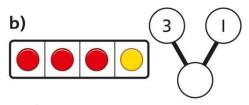
5 = 4 + 1



10 = 7 + 3

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





4 + 0 = 43 + 1 = 4

## Understanding teen numbers as a complete 10 and some more

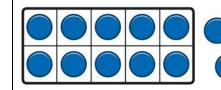
Complete a group of 10 objects and count more.



13 is 10 and 3 more.

## 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.

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

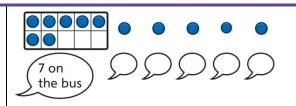
## Adding by counting on

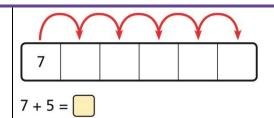
Children use counters to support and represent their counting on strategy.

### Adding by counting on

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







## Adding the 1s

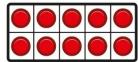
Children use bead strings to recognise how to add the 1s to find the total efficiently.

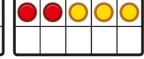


$$2 + 3 = 5$$
  
 $12 + 3 = 15$ 

## Adding the 1s

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





$$2 + 3 = 5$$
  
 $12 + 3 = 15$ 

## 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.

## Bridging the 10 using number bonds

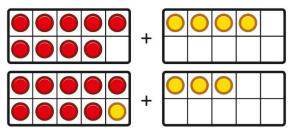
Children use a bead string to complete a 10 and understand how this relates to the addition.



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

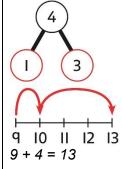
## Bridging the 10 using number bonds

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



## Bridging the 10 using number bonds

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



## Year 1 Subtraction

### Counting back and taking away

Children arrange objects and remove to find how many are left.

## Counting back and taking away

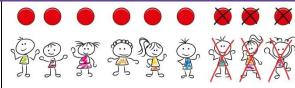
Children draw and cross out or use counters to represent objects from a problem.

### Counting back and taking away

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



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





There are children left.



9 - 3 = 6

## Finding a missing part, given a whole and a part

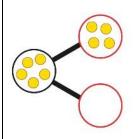
Children separate a whole into parts and understand how one part can be found by subtraction.



8 - 5 = ?

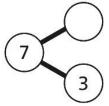
# Finding a missing part, given a whole and a part

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



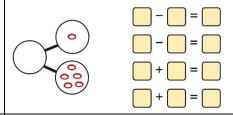
# Finding a missing part, given a whole and a part

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.

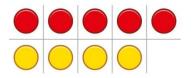


### Finding the difference

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

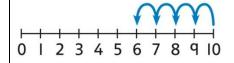
### Finding the difference

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



### Finding the difference

Children understand 'find the difference' as subtraction.



77	1	1	*	6
12				

8 is 2 more than 6. 6 is 2 less than 8. The difference between 8 and 6 is 2. 5 - 4 = 1

The difference between 5 and 4 is 1.

10 - 4 = 6

The difference between 10 and 6 is 4.

#### **Subtraction within 20**

Understand when and how to subtract 1s efficiently.

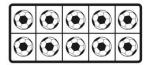
Use a bead string to subtract 1s efficiently.



$$5 - 3 = 2$$
  
 $15 - 3 = 12$ 

#### **Subtraction within 20**

Understand when and how to subtract 1s efficiently.



$$5 - 3 = 2$$
  
 $15 - 3 = 12$ 

#### **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

For example: 18 - 12

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



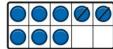
First subtract the 10, then take away 2.

### 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.

## **Subtracting 10s and 1s**

Use a part-whole model to support the calculation.



## 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.

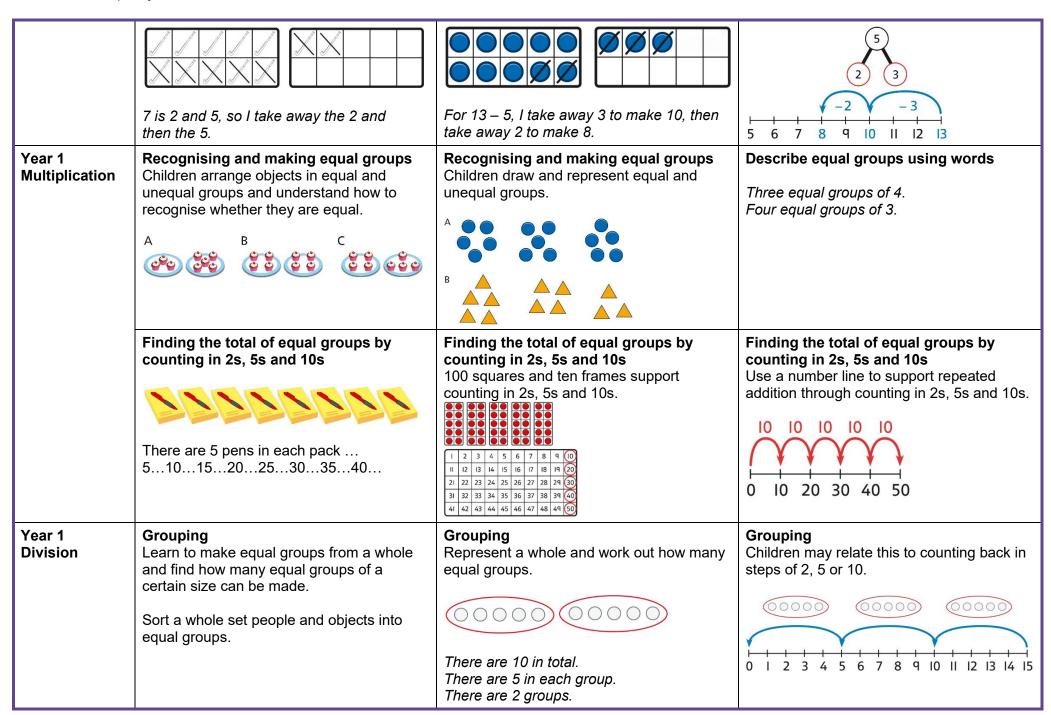
## **Subtraction bridging 10 using number bonds**

Represent the use of bonds using ten frames.

## Subtraction bridging 10 using number bonds

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

13 – 5

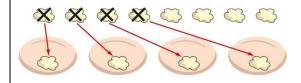




There are 10 children altogether. There are 2 in each group. There are 5 groups.

## **Sharing**

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



## Sharing

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



### Sharing

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

		Year 2	
	Concrete	Pictorial	Abstract
Year 2 Addition			
Understanding 10s and 1s	Group objects into 10s and 1s.  Bundle straws to understand unitising of 10s.	Understand 10s and 1s equipment, and link with visual representations on ten frames.	Represent numbers on a place value grid, using equipment or numerals.  Tens Ones  3 2  Tens Ones 4 3
Adding 10s	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.	Use known bonds and unitising to add 10s.	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	Add the 1s to find the total. Use known bonds within 10.	Add the 1s.	Add the 1s.  Understand the link between counting on and using known number facts. Children

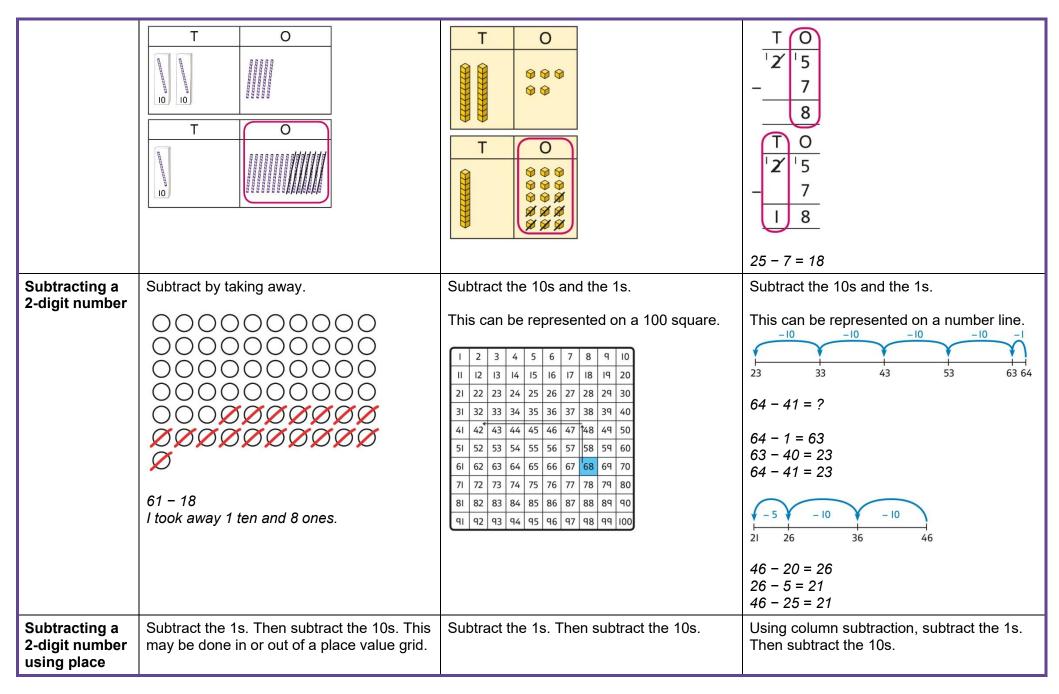
number not bridging a 10	41 is 4 tens and 1 one. 41 add 6 ones is 4 tens and 7 ones.  This can also be done in a place value grid.	34 is 3 tens and 4 ones. 4 ones and 5 ones are 9 ones. The total is 3 tens and 9 ones.	should be encouraged to use known number bonds to improve efficiency and accuracy.  30 31 32 33 34 35 36 37 38 39 40  This can be represented horizontally or vertically. $34 + 5 = 39$ or  T O 3 4 + 5 q
Adding a 1-digit number to a 2-digit number bridging 10	There are 4 tens and 5 ones. I need to add 7. I will use 5 to complete a 10, then add 2 more.	Complete a 10 using number bonds.	Complete a 10 using number bonds.  7 5 2 43 44 45 46 47 48 49 50 51 52 53 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.	Exchange 10 ones for 1 ten.	Exchange 10 ones for 1 ten.

			T O 2 4 + 8 T O 2 4 8 8 3 2 T O C O C O C O C O C O C O C O C O C O
Adding a multiple of 10 to a 2-digit	Add the 10s and then recombine.	Add the 10s and then recombine.	Add the 10s and then recombine. $37 + 20 = ?$
number	* * * * * * * * * * * * * * * * * * *		30 + 20 = 9 30 + 20 = 50 50 + 7 = 57
	27 is 2 tens and 7 ones. 50 is 5 tens.	<ul><li>♀ ♀ ♀ ♀</li><li>66 is 6 tens and 6 ones.</li></ul>	37 + 20 = 57
	There are 7 tens in total and 7 ones. So, 27 + 50 is 7 tens and 7 ones.	66 + 10 = 76	
		A 100 square can support this understanding.	
		1	
Adding a multiple of 10 to a 2-digit number using columns	Add the 10s using a place value grid to support.	Add the 10s using a place value grid to support.	Add the 10s represented vertically. Children must understand how the method relates to unitising of 10s and place value.

	T O  Toffee  T	T O  O  O  O  O  O  O  O  O  O  O  O  O	T O I 6 3 0 4 6 $1+3=4$ $1 ten + 3 tens = 4 tens$ $16 + 30 = 46$
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. $35 + 23 = 58$	Add the 10s and 1s separately. Use a part-whole model to support.  32 + II  11 = 10 + 1 32 + 10 = 42 42 + 1 = 43 32 + 11 = 43	Add the 10s and the 1s separately, bridging 10s where required. A number line can support the calculations.  TO  TO  17 + 25
Adding two 2-digit numbers using a place value grid	Add the 1s. Then add the 10s.		Add the 1s. Then add the 10s.

	Tens Ones  Tens Ones  Tens Ones  Tens Ones		TO 3 2 + 1 4 6 TO 3 2 + 1 4 4 6
Adding two 2-digit numbers with exchange	Add the 1s. Exchange 10 ones for a ten. Then add the 10s.  Tens Ones  q  Tens Ones  Q  Tens Ones  Q  Q  Q  Tens Ones		Add the 1s. Exchange 10 ones for a ten. Then add the 10s.  TO 3 6 +2 9 5 TO 3 6 +2 9 6 5
Year 2 Subtraction			
Subtracting multiples of 10	Use known number bonds and unitising to subtract multiples of 10.	Use known number bonds and unitising to subtract multiples of 10.	Use known number bonds and unitising to subtract multiples of 10.

		100	7 70 70 2 5 20 50
	8 subtract 6 is 2. So, 8 tens subtract 6 tens is 2 tens.	10 - 3 = 7 So, 10 tens subtract 3 tens is 7 tens.	7 tens subtract 5 tens is 2 tens. 70 - 50 = 20
Subtracting a single-digit number	Subtract the 1s. This may be done in or out of a place value grid.	Subtract the 1s. This may be done in or out of a place value grid.	Subtract the 1s. Understand the link between counting back and subtracting the 1s using known bonds.
	10		30 31 32 33 34 35 36 37 38 39 40
	T O	T O	$ \begin{array}{c c} \hline   & T & O \\ \hline   & 3 & 9 \\ \hline   & - & 3 \\ \hline   & 3 & 6 \\ \hline   & 3 & 6 \\ \hline   & 9 - 3 = 6 \\ \hline   & 39 - 3 = 36 \end{array} $
Subtracting a	Bridge 10 by using known bonds.	Bridge 10 by using known bonds.	Bridge 10 by using known bonds.
single-digit number bridging 10			-4 16 17 18 19 20 21 22 23 24 25 26
	35 – 6 I took away 5 counters, then 1 more.	35 – 6 First, I will subtract 5, then 1.	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.	Exchange 1 ten for 10 ones.	Exchange 1 ten for 10 ones.



		I	
value and columns	T O O O O O O O O O O O O O O O O O O O	Tens Ones	T O 4 5 - I 2 3 3 3 3 3
Subtracting a 2-digit number with exchange		Exchange 1 ten for 10 ones. Then subtract the 1s. Then subtract the 10s.  Tens Ones  Tens Ones  Tens Ones  Tens Ones  Tens Ones  Tens Ones	Using column subtraction, exchange 1 ten for 10 ones. Then subtract the 1s. Then subtract the 10s.  TO 45 -27 TO 3/45 -27 TO 3/45 -27 8 TO 3/45 -27 8 TO 3/45 -27 8
Year 2 Multiplication			
Equal groups and repeated addition	Recognise equal groups and write as repeated addition and as multiplication.	Recognise equal groups using standard objects such as counters and write as repeated addition and multiplication.	Use a number line and write as repeated addition and as multiplication.

	3 groups of 5 chairs 15 chairs altogether	3 groups of 5 15 in total	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Using arrays to represent multiplication and support understanding	Understand the relationship between arrays, multiplication and repeated addition.	Understand the relationship between arrays, multiplication and repeated addition.	Understand the relationship between arrays, multiplication and repeated addition. $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
	4 groups of 5	4 groups of 5 5 groups of 5	
Understanding commutativity	Use arrays to visualise commutativity.	Form arrays using counters to visualise commutativity. Rotate the array to show that orientation does not change the multiplication.	Use arrays to visualise commutativity.
	I can see 6 groups of 3. I can see 3 groups of 6.	This is 2 groups of 6 and also 6 groups of 2.	4+4+4+4+4=20 5+5+5+5=20 $4 \times 5 = 20$ and $5 \times 4 = 20$
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.	Understand how to relate counting in unitised groups and repeated addition with knowing key times-table facts.	Understand how the times-tables increase and contain patterns.

		00000000	IO
		00000000	10 10
	3 groups of 10 10, 20, 30 3 × 10 = 30	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	10 10 10 10 10 10 10 10 10 10 10 10 10 1
Year 2 Division			5 × 10 = 50 6 × 10 = 60
Sharing equally	Start with a whole and share into equal parts, one at a time.	Represent the objects shared into equal parts using a bar model.	Use a bar model to support understanding of the division.

