Addition

Foundation Stage 1 Objectives:

Birth –to 11 months – notice changes in number of objects/images, sounds in groups of and up to 3

8 – 20 months - has some understanding that things exist even when out of sight

16-26 months – Begins to organise and categorise objects -sorting

22 – 36 months – knows that a group of things changes in quantity when something is added

30 – 50 months – separates a group of 3 or 4 objects in different ways, beginning to recognise that the total is still the same

In practical activities and discussions begins to use the vocabulary involved in addition
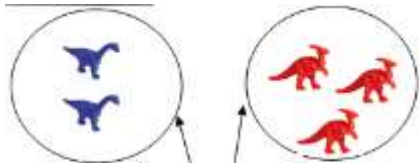
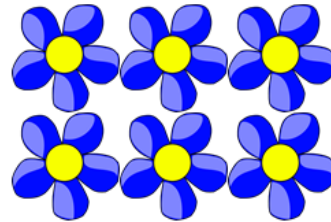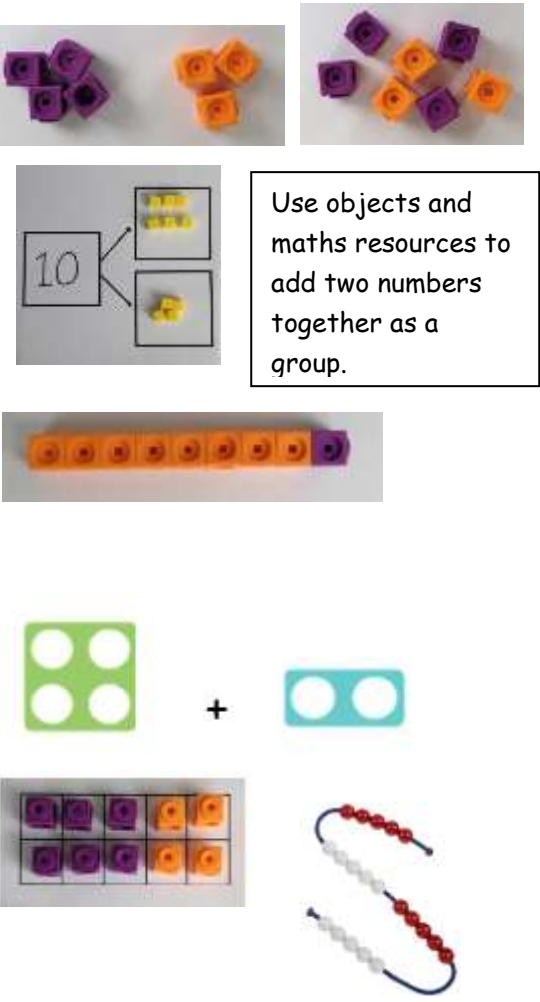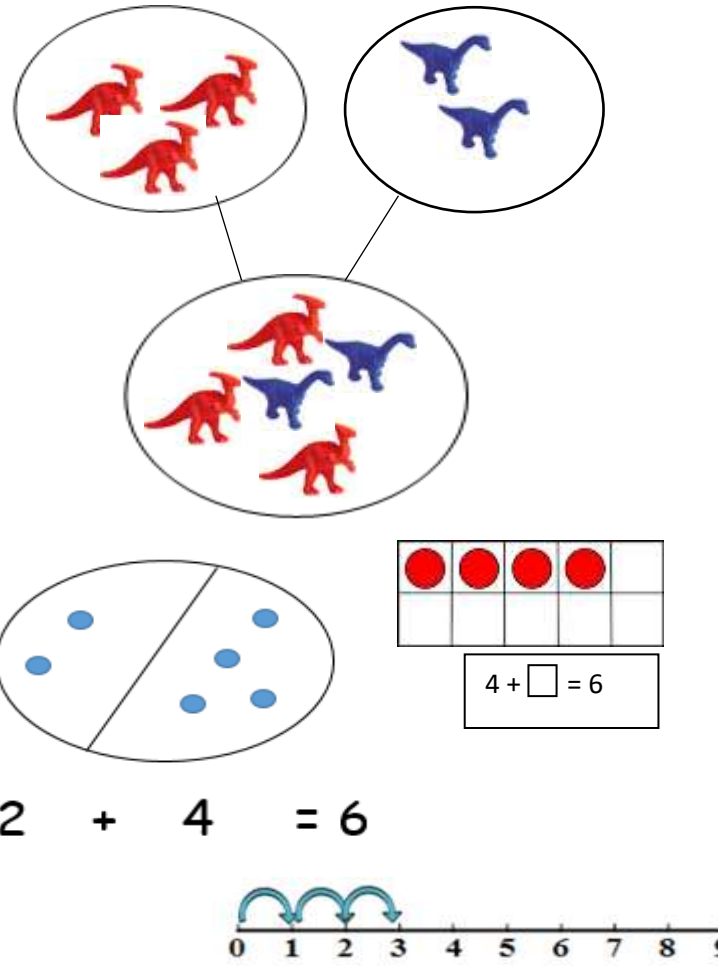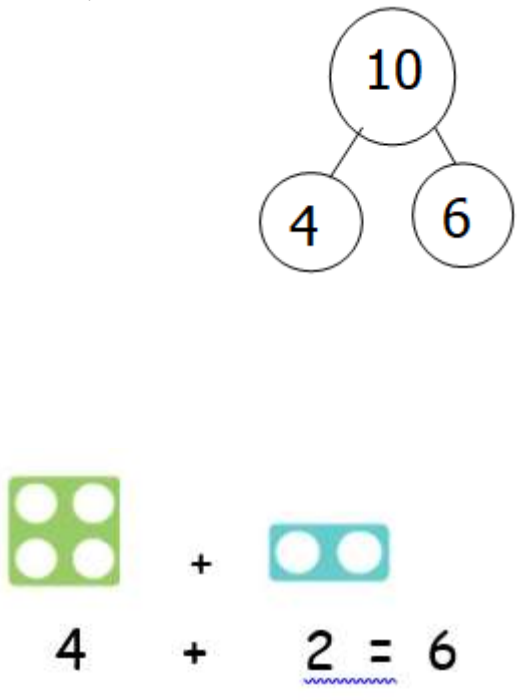| Concrete	Pictorial	Abstract
Nursery rhymes and number stories. Using numbers and objects in the environment	I can count …	Writing the digit to represent the quantity
Counting using hands and through movement. Counting using concrete objects for 1 to 1 correspondence as well as for grouping and partitioning		6
Sorting into two bowls		

Foundation Stage 2 Objectives:
40-60 months – finds the total number of items in two groups by counting all of them

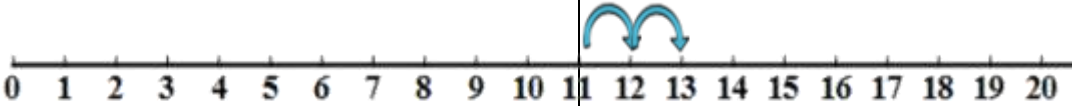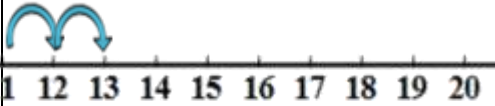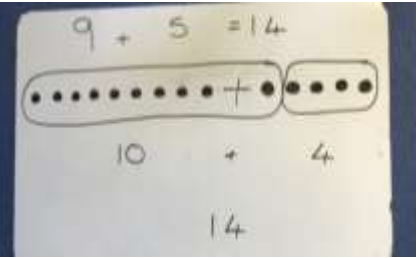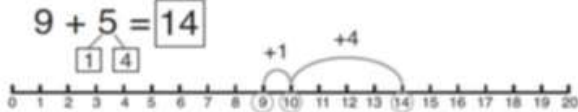Early Learning Goal - Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number.
Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.
Count on from first group to add two groups of objects

Concrete	Pictorial	Abstract
Use objects and maths resources to add two numbers together as a group.	Use pictures to add 2 numbers together 4 + ☐ = 6 2 + 4 = 6	Children will annotate their pictures with number sentences. 4 + 2 = 6

Year 1 Objectives:
- read, write and interpret mathematical statements involving addition (+) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add one-digit and two-digit numbers to 20, including
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as
- $17 = \square - 9$

Concrete	Pictorial	Abstract
Using resources to investigate the creation of numbers up to 20. First steps to bridging. Using place value – counting on in ones, using a number line, bead string and 100 square etc.	Drawing images to reflect concrete representations Start with the larger number and count on. 	Writing the number sentences to support the pictorial $9 + 5 = 14$
Progressing onto using knowledge of numbers bonds within 10 when crossing the tens boundary e.g. $9 + 5 =$ Start with the 9, then add 1 to make 10, then add the remaining 4. 	Use pictures or a number line. Regroup or partition the smaller number to make 10. 	Place the larger number in your head and count on the smaller number to find the answer. **5** + **9** = **14** **9** + **1** = **10** **10** + **4** = **14** If I have nine, how many more do I need to make 10? How many more do I add on now? 15 +1 = 16 16 = 15 + 1 (commutative law)

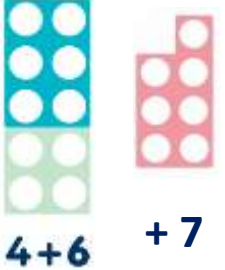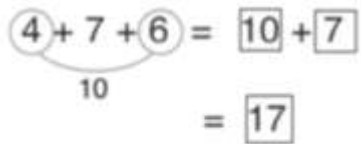Finding missing numbers.

12 — 3

?
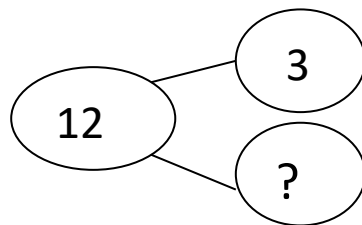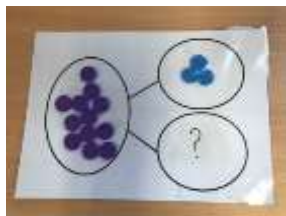
$3 + \boxed{} = 12$ $\boxed{} + 6 = 15$
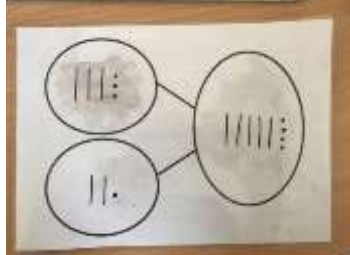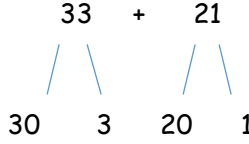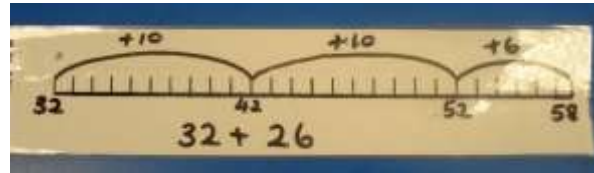
Year 2 Objectives:
- solve problems with addition:
  - using concrete objects and pictorial representations, including those involving numbers, quantities and measures
  - applying their increasing knowledge of mental and written methods
- recall and use addition facts to 20 fluently, and derive and use related facts up to 100
- add numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and 1s
  - a two-digit number and 10s
  - 2 two-digit numbers
  - adding 3 one-digit numbers
- show that addition of 2 numbers can be done in any order (commutative)

recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

Concrete	Pictorial	Abstract
4 + 7 + 6 = 17 Put 4 and 6 together to make 10. Add on 7. **4+6** **+ 7** Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	 Add together three groups of objects. Draw a picture to recombine the groups to make 10.	 Combine the two numbers that make 10 and then add on the remainder.
Partitioning both numbers into tens and ones 33 + 21 = 54 OR 21 + 33 = 54 	Start with the two parts and combine to create the whole (Representing the concrete). 	33 + 21 = 30 + 20 = 50 3 + 1 = 4 50 + 4 = 54 33 + 21 / \ / \ 30 3 20 1

Adding the second number to the first by partitioning the tens and ones, using a variety of resources		32 + 26 = 58 32 + 20 = 52 52 + 6 = 58 32 + 26 32 20 6
Use manipulatives to secure understanding of crossing 10's boundaries. 24 + 18 = 42 Add together the ones first then add the tens. Develop to include regrouping. 	 1)one's first 2)draw 12 3)then the tens	Progress onto the expanded written column method, with column headings. Up to 2 by 2 digits without crossing the 10s boundary initially but achieving by the end of the year. $$\begin{array}{r} \ \ T\ \ \ O \\ 2\ \ \ \ 4 \\ +\ \ 1\ \ \ \ 8 \\ \hline 1\ \ \ \ 2 \\ 3\ \ \ \ 0 \\ \hline 4\ \ \ \ 2 \\ \hline \end{array}$$
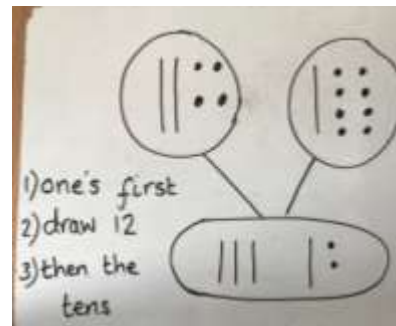
Year 3 Objectives:
- add numbers mentally, including:
  - a three-digit number and 1s
  - a three-digit number and 10s
  - a three-digit number and 100s
- add numbers with up to 3 digits, using formal written methods of column addition
- estimate the answer to a calculation and use inverse operations to check answers
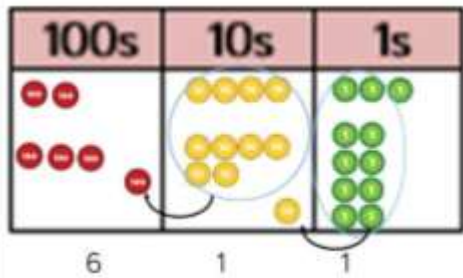- solve problems, including missing number problems, using number facts, place value, and more complex addition
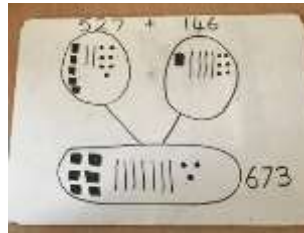
Concrete	Pictorial	Abstract
Use e.g. base ten, place value counters. Begin in the ones column. For every 10 created exchange for a 10 counter. As children move on to decimals and money, decimal place value counters can be used to support learning.	Draw images to represent concrete resources: These informal representations may be used to clarify understanding and can be used alongside number lines. It will also aid fluency in mental calculations. The bar model can reinforce the concept of part part whole.	Expanded formal written method with labelled columns and starting with the ones column, progressing from: 1. No crossing of boundaries 2. Crossing the tens or hundreds boundary in 3 digit number 3. A combination of the above. $475 + 267 = 742$ Progressing on to compact column method.
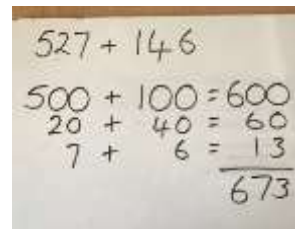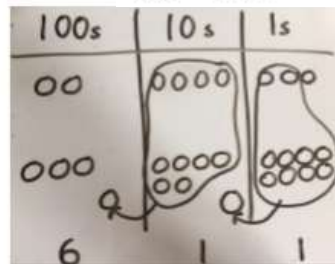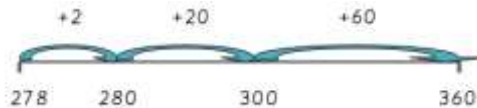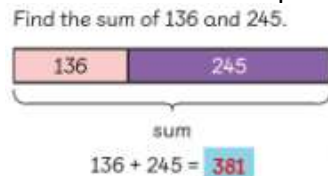
Year 4 Objectives:
- add numbers with up to 4 digits using the formal written methods of column addition where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition two-step problems in contexts, deciding which operations and methods to use and why

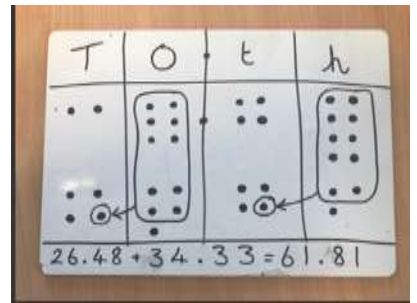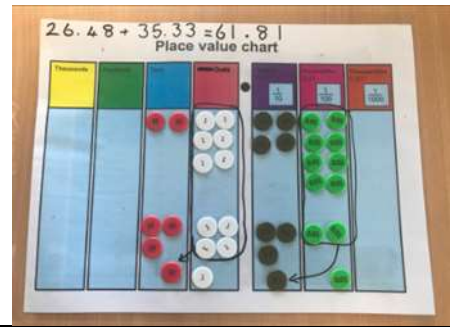| Concrete	Pictorial	Abstract
See above.	See above.	Formal written method with columns labelled Progressing from adding 2 four digit numbers to adding 3 four digit numbers, not exceeding the thousands column. Build knowledge by crossing one boundary at a time, beginning with the tens. Develop understanding by moving onto crossing multiple boundaries, not following a set pattern. Variation – missing numbers.

A line to be left to record numbers crossing boundaries either above or below the answer. To be consistent at your school (numbers written smaller).

Abstract (first example):

```
     Th   H   T   O
      4   3   6   5
 +    2   5   7   6
     _____
          1   1
     _____
      6   9   4   1
     _____
```

Abstract (second example):

```
     Th   H   T   O
      4   3   6   5
 +    2   5   8   6
     _____
      1   3   7   4
      1   2   1
     _____
      8   3   2   5
     _____
```

Concrete (bottom):

26.48 + 35.33 = 61.81
Place value chart

Pictorial (bottom):

T   O . t   h

26.48 + 34.33 = 61.81

Abstract (bottom):

When secure, progress to adding money with two decimal places. Place value headings to be labelled.

```
     Tk   H       T   O
      2   9   .   4   5
 +    2   5   .   2   9
     _____
      1       .   1
     _____
   £  5   4   .   7   4
     _____
```

There were 6000 books for sale at a book fair.
3419 books were sold on the first day of the fair and
2268 books were sold on the second day.
How many books were left at the end of the second day?

6000

3419   2268   ?
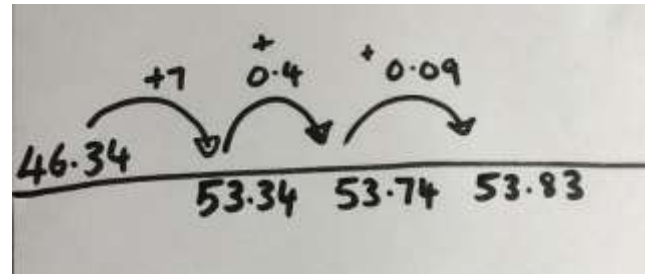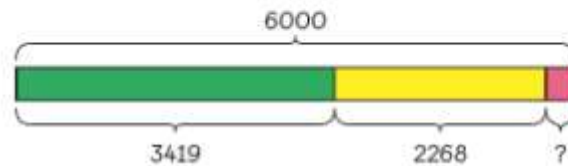
To promote fluency number lines can be used for addition of decimals

Start by partitioning the numbers before moving on to clearly show the exchange below the addition.

$$20 + 5$$
$$40 + 8$$
$$60 + 13 = 73$$

As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.

$$536$$
$$+ 85$$
$$621$$
$$1\ 1$$

$$72.8$$
$$+ 54.6$$
$$127.4$$
$$1\ 1$$

	£	2	3	.	5	9
+	£		7	.	5	5
	£	3	1	.	1	4
		1	1		1	

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

Year 5 Objectives:
- add whole numbers with more than 4 digits, including using formal written methods (columnar addition)
- add numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition multi-step problems in contexts, deciding which operations and methods to use and why

Concrete	Pictorial	Abstract
See above	Where necessary do not be afraid to use the expanded method for initial explanation. Number lines promote fluency and are a clear assessment tool for teachers. Bar models to be used to support their understanding of problems – help them identify what they need to do.	Addition of 4 and 5 digit numbers to one million.

Abstract column content:

Addition of 4 and 5 digit numbers to one million.

```
      TTh  Th  H  T  O
        2   9  6  1  5
  +     2   5  4  3  9
        4   3  5  2  3
        _____
        1   1     1
        _____
        9   8  5  7  7
```

Children provided with numbers where they have to decide whether to 'carry' or not – this will identify if they have a secure understanding of place value.

Pupils to record numbers using commas e.g. 98,577
Addition of numbers with 2 decimal places in context e.g. money and measurement.

```
      H  T  O  .  t  h
      2  3  8  .  8  4
  +   4  2  6  .  5  2
      _____
         1  1  .
      _____
   £  6  6  5  .  3  6
```

Pupils to use estimation before completing calculations. Provide examples in context to support understanding of the importance of estimating. Use rounding to estimate. E.g.
423 + 158 + 296 =   Estimate: 420 + 160 + 300 =

Year 6 Objectives:
- perform mental calculations, including with mixed operations and large numbers
- solve addition multi-step problems in contexts, deciding which operations and methods to use and why
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Concrete	Pictorial	Abstract
See above for concrete examples to use when beginning addition work to emphasise the need to exchange when you make ten and place value understanding.	**See above for pictorial images to use when beginning addition work.**	Pupils to record numbers using commas e.g. 2,598,577

Addition of numbers, not exceeding 10 million.

```
        1   2   6   3   4   3
  +     2   8   7   3   5   2
        3   2   2   1   5   4
        1   1       1
       _____
        7   3   5   8   4   9
       _____
```

Addition of numbers with up to 3 decimal places, using 0 as a place holder.

```
        1  .  8   2   1
  +     0  .  4   3   3
        2  .  0   2   6
        1  .          1
       _____
        4  .  2   8   0
       _____
```