

### Numbers Early Learning Goal

Count reliably with numbers from 1 to 20, place them in order and say which number is **one more** or one less than a given number.

Using quantities and objects, **add** and subtract **two single-digit numbers** and count on or count back to find the answer.

Solve problems, including **doubling** and halving.

#### Exceeding judgement

Estimate a number of objects and check quantities by counting up to 20.

Solve practical problems that involve combining groups of 2, 5 or 10.

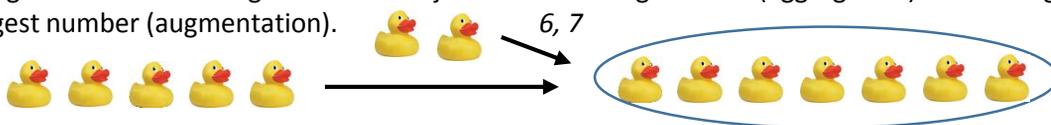
### Models and Strategies

**Recognise numbers 1-20** using a range of activities (e.g. flash cards, board games, Numicon ordering cards).

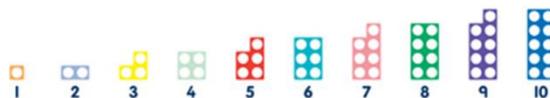
#### Adding by combining sets of objects.

Concepts are taught in the context of real life using concrete apparatus and pictorial representations.

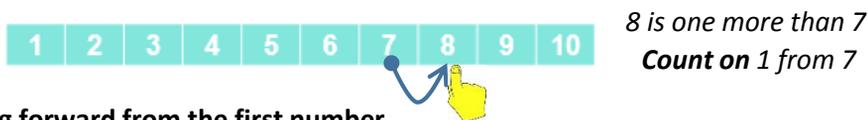
Children will progress from combining two sets of objects and counting them all (aggregation) to counting on from the largest number (augmentation).



**Use of Numicon to identify one more than a given number and to begin to add without counting.**



**Use of number tracks to find one more.**



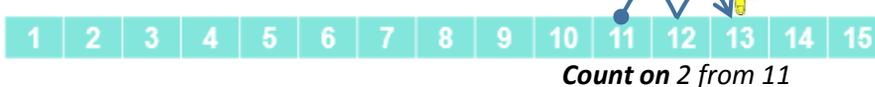
#### Adding by counting forward from the first number.

On a bead string:

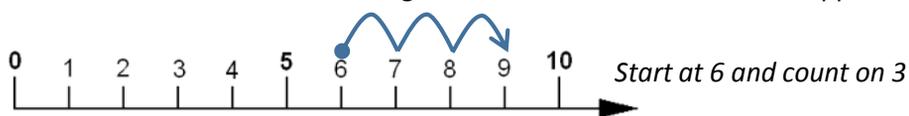


"7 add 3 is 10."

On a number track:

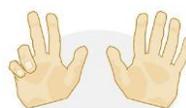
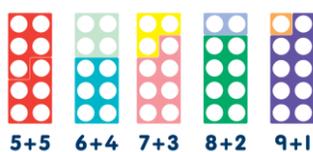


Number lines can then be used alongside number tracks and concrete apparatus:



#### Number bonds to 10.

Using Numicon



$$8 + 2 = 10$$

$$10 - 2 = 8$$

#### Doubling.



Double 2 is 4

#### Vocabulary of addition.

Through a variety of activities (e.g. role play, songs, rhymes) promote the language associated with addition: *add, more, total, altogether, sum, plus, make, count on.*

#### Recording.

Pupils make a record in pictures, words, symbols or marks they can interpret of the addition activities that have been carried out. Begin to record addition calculations using + and = signs.

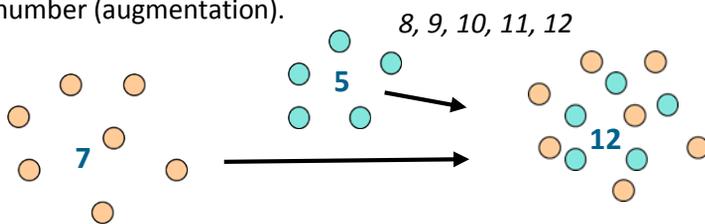
## Objectives

- Represent and use number bonds and related subtraction facts within 20.
- Add one-digit and two-digit numbers to 20, including zero.
- Read, write and interpret mathematical statements involving addition (+) and equals (=) signs.
- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as  $7 = \square + 4$ .

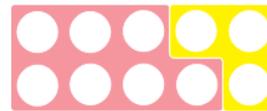
## Models and Strategies

### Counting and combining sets of objects.

Children will progress from combining two sets of objects (aggregation) to counting on from the largest number (augmentation).



Using Numicon



### Counting on from the first number using a number track.

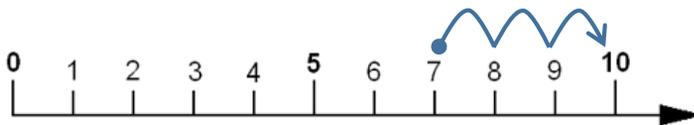
E.g. 5 more than 7



Start at 7 and count on 5

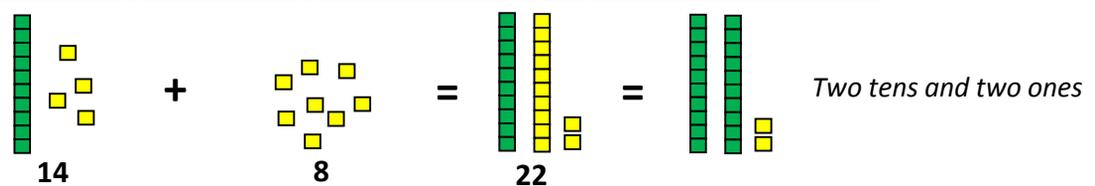
### Counting on with a bead string and number line.

E.g. 3 more than 7



### Begin to use Dienes apparatus to support understanding of place value and addition.

E.g.



Two tens and two ones

### Recording.

Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.

$$2 = 1 + 1$$

$$2 + 3 = 4 + 1$$

**Missing numbers** need to be placed in all possible places.

$$3 + 4 = \square \quad \square = 3 + 4$$

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

### Vocabulary of addition.

Through a variety of activities (e.g. role play, songs, rhymes) continue to promote the language of addition: *add, more, total, altogether, sum, plus, make, count on.*

## Objectives

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 ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers

Show that addition of two numbers can be done in any order (commutative).

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

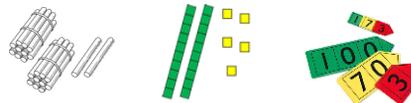
Solve addition problems using concrete objects and pictorial representations, and apply their increasing knowledge of mental and written methods.

Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (from *Measurement*).

## Models, Strategies and Methods

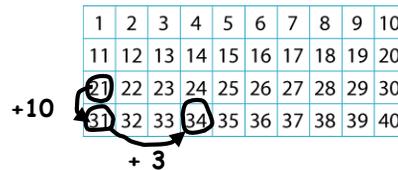
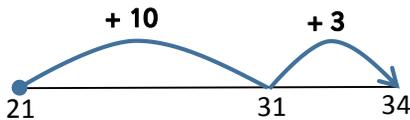
Continue to use a range of representations (see Year 1).

Partition and recombine, progressing from bundles of straws to Dienes apparatus and place value cards.



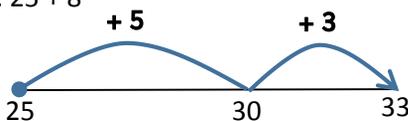
### Counting on in tens and ones.

E.g.  $21 + 13$  on an empty number line or 100 square.



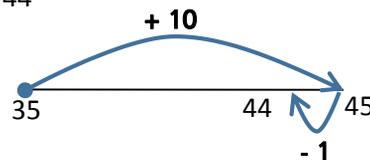
### Partitioning and bridging through 10.

E.g.  $25 + 8$

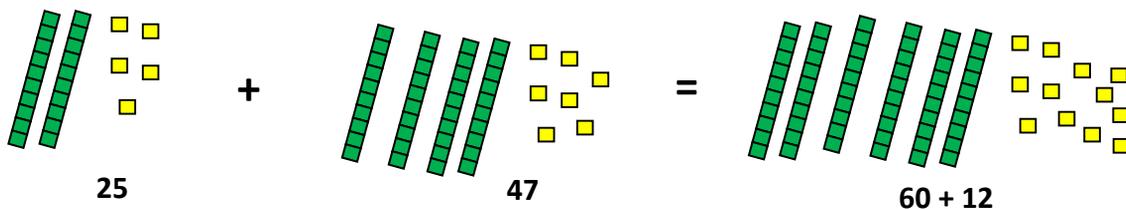


### Adding near multiples of 10 by adding 10 and adjusting by 1.

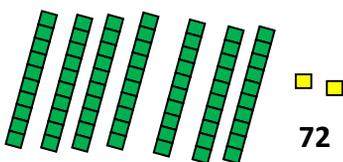
E.g.  $35 + 9 = 44$



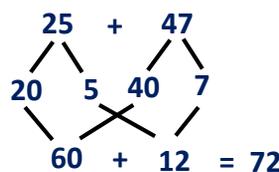
### Working towards a written method.



Leading to **exchanging**:



**Informal recording:**



$$20 + 40 = 60$$

$$5 + 7 = 12$$

$$60 + 12 = 72$$

### Using inverse relationships.

E.g.  $8 + \square = 12$

$12 - 8 = 4$  so missing number is 4.

12	
8	?

### Objectives

Add numbers mentally, including:

- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds

Add numbers with up to three digits, using formal written method 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 and subtraction.

Add fractions with the same denominator within one whole (e.g.  $\frac{1}{3} + \frac{2}{3} = \frac{3}{3}$ ).

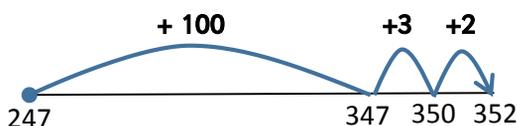
### Models, Strategies and Methods

**Mental strategies:** continue to develop fluency in mental strategies of addition.

e.g. partitioning, doubles and near doubles, patterns of similar calculations (e.g.  $8 + 4 = 12$ , so  $80 + 40 = 120$  and  $800 + 400 = 1200$ ), adding near multiples of 10 (e.g. adding 29 by adding 30 and adjusting by 1).

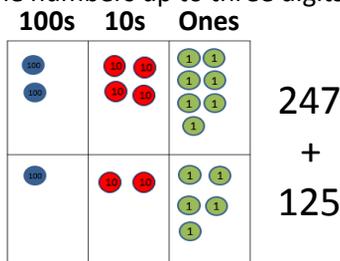
**Informal methods:** continue to solve by partitioning/recombining or counting on using empty number line.

$$\begin{aligned} \text{e.g. } 247 + 105 &= 247 + 100 + 5 \\ &= 347 + 5 \\ &= 352 \end{aligned}$$

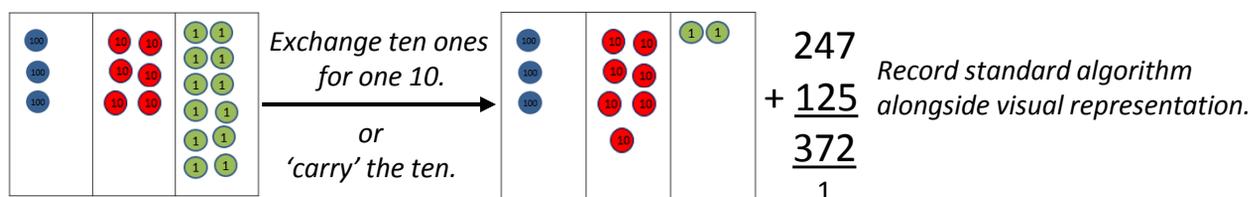


#### Introducing a formal written method.

Introduce column addition using place value counters (Dienes could be used for those who need a less abstract representation). Use with whole numbers up to three digits.



Leading children to understand the **exchange** between tens and ones.

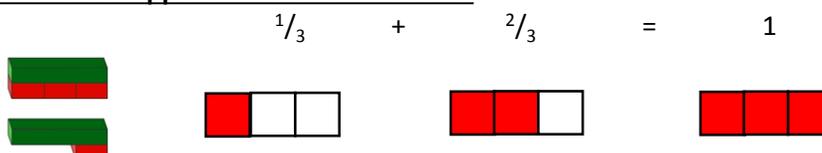


**Missing number/digit problems** using a range of equations as in Year 1 and 2 but with appropriate, larger numbers, including the formal algorithm.

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

**Using Cuisenaire rods or bar model to support addition of fractions.**

e.g.  $\frac{1}{3} + \frac{2}{3} = \frac{3}{3}$  (1 whole)



### Objectives

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

### Models, Strategies and Methods

**Mental strategies and informal methods:** continue to develop fluency in mental strategies of addition, supported by a range of models and images, including the number line.  
 e.g. partitioning (such as  $5.6 + 3.2 = 5.6 + 3 + 0.2$ ), doubles and near doubles, patterns of similar calculations (e.g.  $8 + 4 = 12$ , so  $0.8 + 0.4 = 1.2$ ), compensating (e.g. add 48 by adding 50 and adjusting by 2).

**Formal written method.**

Revise formal column method using place value counters (or Dienes), as modelled in Year 3. Progress to calculations with 4-digit numbers.

● ●	●●●●	●●●	●●●
●●●	●●●●	●●	●●●●
7	1	5	1
●		●	

$$\begin{array}{r} 2634 \\ + 4517 \\ \hline 7151 \\ 1 \quad 1 \end{array}$$

*Record standard algorithm alongside visual representation.*

*Exchange ten hundreds for one 1000.*

*Exchange ten ones for one 10 or 'carry' the ten*

Extend to up to two places of decimals (same number of decimal places) and adding several numbers (with different numbers of digits). Add decimals in the context of money and measures.

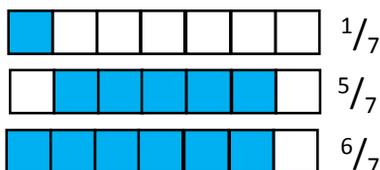
$$\begin{array}{r} 72.8 \\ + 54.6 \\ \hline 127.4 \\ 1 \quad 1 \end{array}$$

**Missing number/digit problems.**

$$\begin{array}{r} 4 \square 4 \\ + 38\square \\ \hline 851 \end{array}$$

**Using Cuisenaire rods or bar model to support addition of fractions.**

e.g.  $\frac{1}{7} + \frac{5}{7} = \frac{6}{7}$



### Objectives

- Add mentally with increasingly large numbers.
- Add whole numbers with more than 4 digits, including use of formal written method (column addition).
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Add fractions with the same denominator, and denominators that are multiples of the same number.

### Models, Strategies and Methods

Pupils should make choices about whether to solve addition problems mentally, using jottings (informal methods) or using a formal written method, depending on the numbers involved.

**Mental strategies and informal methods:** continue to develop fluency in mental strategies of addition, supported by a range of models and images, including the number line. Children should practise with increasingly large numbers to aid fluency. e.g.  $12,462 + 2,300 = 12,462 + 2000 + 300 = 14,762$ .  
Use a number line to solve addition problems involving time and negative numbers.

#### Formal written method.

Revise formal column method, using place value counters to support understanding (if required), as modelled in Year 4. Progress to calculations with more than 4-digit numbers.

$$\begin{array}{r} 23454 \\ + \quad 596 \\ \hline 24050 \\ \quad 111 \end{array}$$

Place value counters can be used alongside the column method to develop understanding of column addition with decimal numbers. Add numbers with different numbers of decimal places (and up to three decimal places). Empty decimal places can be filled with a zero.

E.g.  $172.8 + 54.68$

$$\begin{array}{r} 172.80 \\ + \quad 54.68 \\ \hline 227.48 \\ \quad 11 \end{array}$$

#### Missing number/digit problems.

E.g. Here are some number cards. Use **five of the number cards** to make this correct.

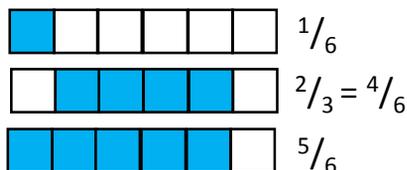
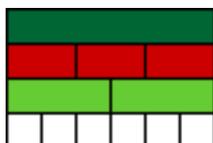
4	4	4			
9	9	9			

5	4	8		

**Using Cuisenaire rods or bar model** to support understanding of equivalence and addition of fractions.

E.g.  $\frac{2}{3} + \frac{1}{6} = \frac{4}{6} + \frac{1}{6} = \frac{5}{6}$



## Objectives

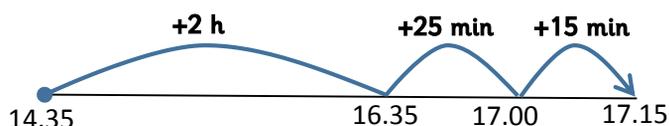
Perform mental calculations, including with mixed operations and large numbers.  
 Use their knowledge of the order of operations to carry out calculations involving the four operations.  
 Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.  
 Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.  
 Solve problems involving addition, subtraction, multiplication and division.  
 Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

## Models, Strategies and Methods

Pupils should make choices about whether to solve addition problems mentally, using jottings (informal methods) or using a formal written method, depending on the numbers involved.

**Mental strategies and informal methods:** continue to develop fluency in mental strategies of addition, supported by a range of models and images, including the number line. Children should practise with increasingly large numbers to aid fluency.

Use a number line to solve addition problems involving time and negative numbers.  
 E.g. A film starts at 14.35 and lasts for 2h and 40min. What time does it finish?



### Formal written method.

Revise formal column method. As in Year 5, progress to larger numbers, aiming for both conceptual understanding and procedural fluency to be secure.

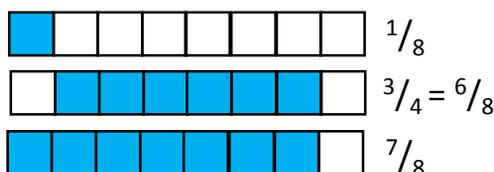
Continue calculating with decimals, including those with different numbers of decimal places (up to three decimal places), using place value counters alongside the column method to develop understanding. Empty decimal places can be filled with a zero.

### Missing number/digit problems.

$$\begin{array}{r}
 \square 6 \square 8 \\
 + 3 \square 9 \square \\
 \hline
 9019
 \end{array}$$

### Addition of fractions.

Use Cuisenaire rods or bar model to support understanding of equivalence and addition of fractions.  
 e.g.  $\frac{3}{4} + \frac{1}{8} = \frac{6}{8} + \frac{1}{8} = \frac{7}{8}$



Convert mixed numbers to improper fractions and *vice versa*.

e.g.  $\frac{3}{4} + \frac{7}{8} = \frac{6}{8} + \frac{7}{8} = \frac{13}{8} = 1\frac{5}{8}$