

PROGRESSION THROUGH CALCULATIONS FOR ADDITION

MENTAL CALCULATION (on-going)

These are a **selection** of mental calculation strategies:

See NNS Framework Section 5, pages 30-41 and Section 6, pages 40-47

At Hasland Infant School we teach calculation in a systematic and progressive way both throughout the school and throughout each year group. We use elements of the White Rose documentation and ideas from NCETM which are incorporated into our daily teaching of maths.

Each session begins with a 'Daily Count and Fluency' session. This is planned by each class teacher to ensure each class is given opportunities to revisit and practise different concepts within Numeracy.

Once children have been taught a new strategy for addition and they are confident with the process all children then move on to reasoning and problem solving activities to extend and deepen their understanding of this concept.

Children are often asked to prove how they know something which they are encouraged to do through the use of objects, pictures or a written calculation.

Mental recall of number bonds

$$6 + 4 = 10$$

$$30 + 70 = 100$$

$$\square + 3 = 10$$

$$19 + \square = 20$$

Use of doubles and near doubles

$$7 + 7 = 14$$

$$6 + 7 = \text{double } 6 + 7 = 13$$

Addition using partitioning and recombining

$$34 + 45 = (30 + 40) + (4 + 5) = 79$$

Use the relationship between addition and subtraction

$$36 + 19 = 55$$

$$55 - 19 = 36$$

$$19 + 36 = 55$$

$$55 - 36 = 19$$

MANY MENTAL CALCULATION STRATEGIES WILL CONTINUE TO BE USED. THEY ARE NOT REPLACED BY WRITTEN METHODS.

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

Nursery

Before addition can be introduced, children need to have a secure knowledge of number. In Nursery, children are introduced to the concept of counting, number order and number recognition through practical activities and games as outlined below. Subitising, where children are secure in recognising quantities without counting begins early in Nursery and continues through Reception as part of the Number and Number System planning.

Children are taught all number objectives within the 30-50 month age band from the Development Matters curriculum.

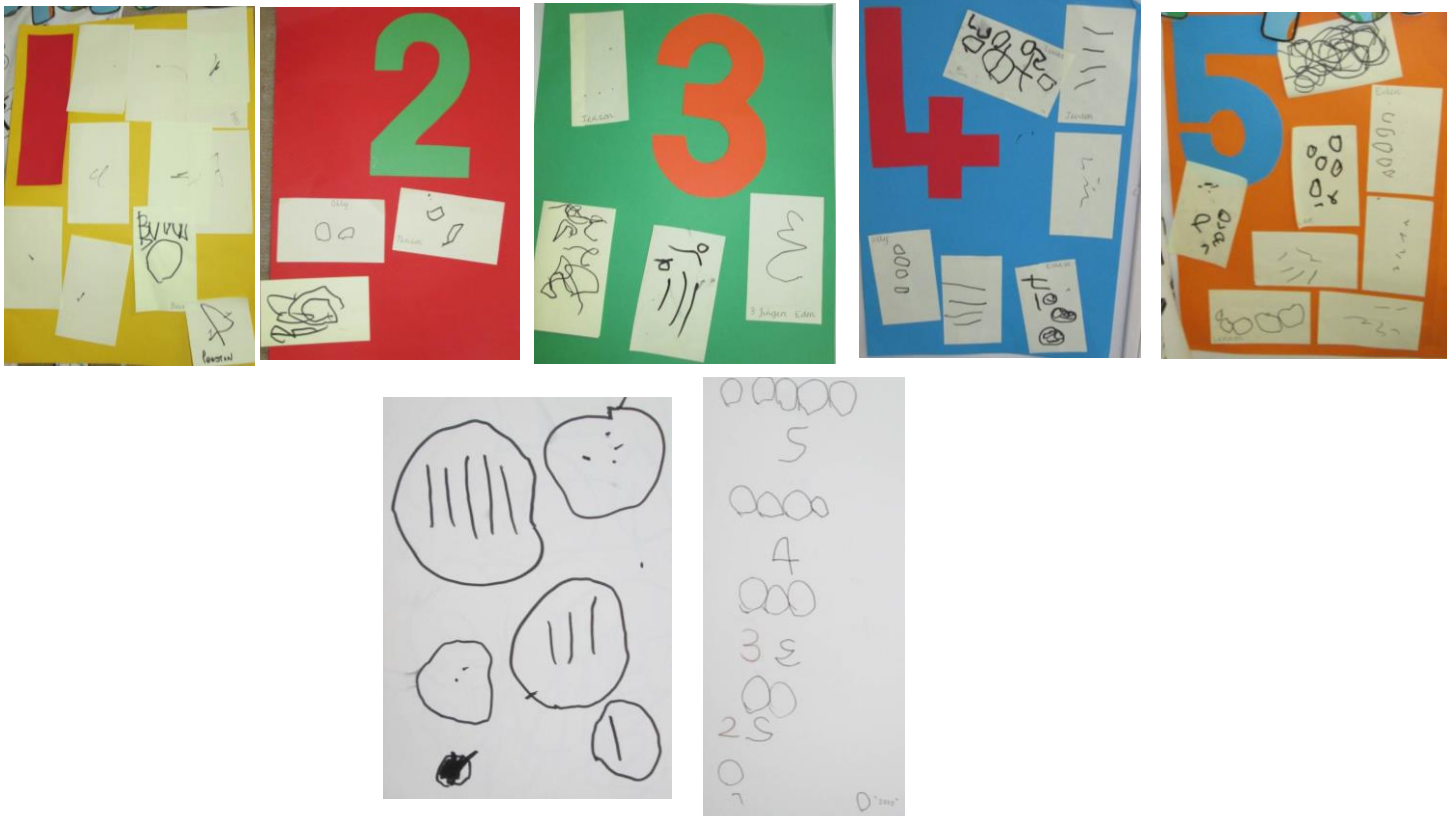
Children are exposed to counting songs and rhymes on a daily basis through adult led/guided and independent activities e.g. 5 speckled frogs, 1, 2,3,4,5, sing a song of numbers.

Concept of number and value is taught through the use of the 'Ten Town' Characters and through children being exposed to different representations of number.

e.g. – fingers/tally marks, dice patterns etc

Children are encouraged to and have the opportunity to be heard to count out loud on an individual basis.

Opportunities for children to explore number are paramount. e.g. how can we represent 3 using lolly sticks? What do we notice? What can you see that's the same or different?



Children are exposed to counting with 1:1 correspondence through daily activities, routines and planned opportunities using claps, beats, steps and objects.

Nursery Addition –

Adults model the initial addition vocabulary at an age appropriate level. They model the language of number and use contrasting vocabulary right from the start.

‘This domino has fewer spots, this domino has more spots’

Children learn how to distinguish the difference between sets of objects and when two groups are of the same size before moving onto 1 more and 1 less

Children are encouraged to show an interest in Number problems through daily interactions with adults within the continuous provision.

For example: -

Role play - I wanted 3 apples, but I’ve only got 2, what could I do?

Mark making - I’ve drawn 4 spots, but meant to draw 5, how many more should I draw?

Water – Look 2 speckled frogs are in the water and 3 are on the log..how many are there altogether?

Maths area – Which other dominoes have 4 spots. What’s the same? What’s different?

Children will engage in a wide variety of songs and rhymes, games and activities.

Children will find one more than a given number.

Children use the language of 1 more and 1 less in practical contexts – role play – , playdough cakes and buns and through real experiences at snack time.

They will be able to use numbers in stories to depict addition ie 2 cats went for a walk and saw 1 more cat. He decided to join them now there are 3 cats...

They will begin to relate addition to combining 2 groups of objects, first by counting all and then by counting on from the largest number.

Through dice games, they will progress from counting all spots to recognising the patterns and counting on from that:

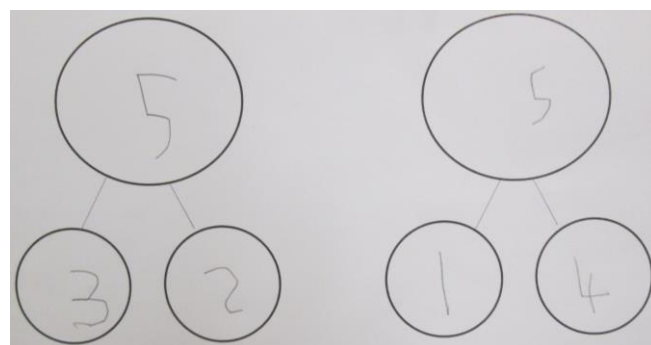
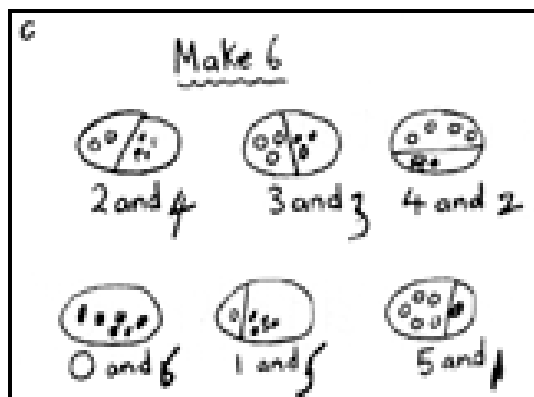


”That is 2, so there is 3,4,5 altogether”.

In practical activities and through discussion children begin to solve addition problems and use the appropriate vocabulary, ie “You have 4 bananas and I have 2; how many bananas are there altogether?”. Children to verbally say the number sentence in full NOT just the answer ie $2 + 2 = 4$

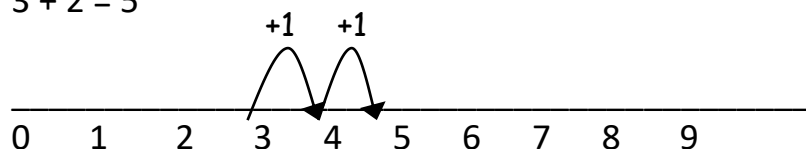
YR

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc. Children also use the part-whole model as a strategy for addition.

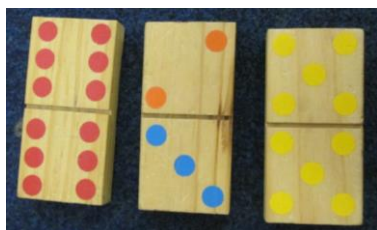


They use numberlines and practical resources to support calculation and teachers *demonstrate* the use of the numberline.

$$3 + 2 = 5$$



Children have access to and use a variety of different resources in order to represent their understanding of addition concepts.



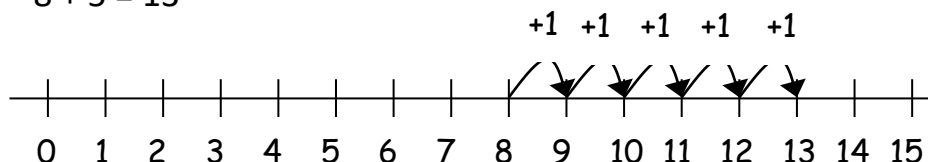
In Reception, children focus on working within the number 5 during the Autumn term. This then progresses to within 10 during Spring and within 20 during Summer. This ensures children have a secure understanding of number.

Y1

Children begin their addition learning by exploring the part part whole model. This helps children to understand the meaning of each number in a number sentence. Children use the part part whole model to help them to recall number bonds to 5 and to 10.

Children begin to use numberlines to support their own calculations to count on in ones.

$$8 + 5 = 13$$

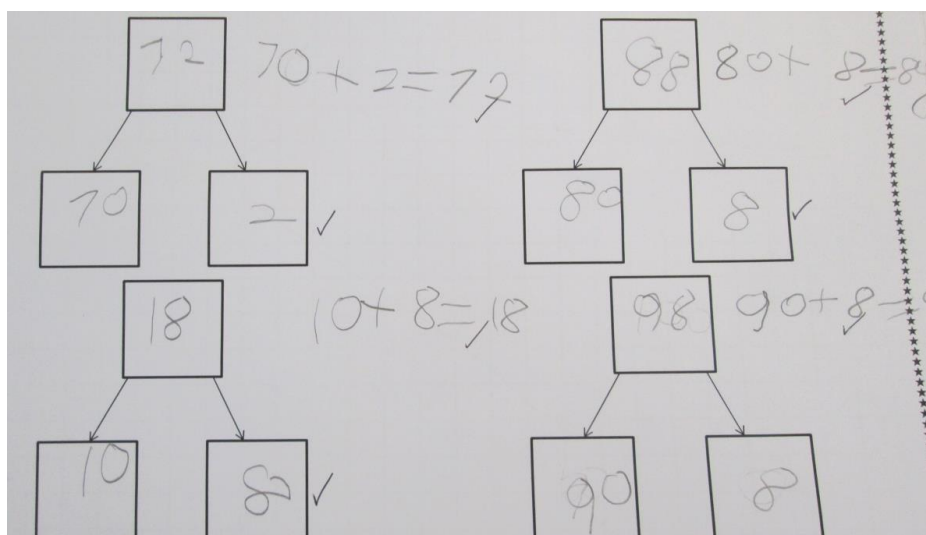
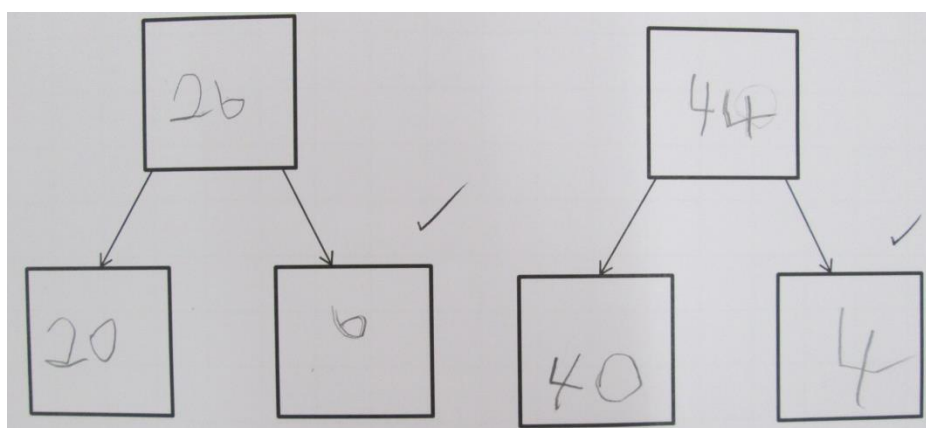


Children begin to add by putting the biggest number in their head and counting on using their fingers.

Children use base 10 to help with their understanding of place value. They begin to use this to help add 10 to a number.

Children also use the part-part whole model as a strategy to identify a missing number within an addition calculation.

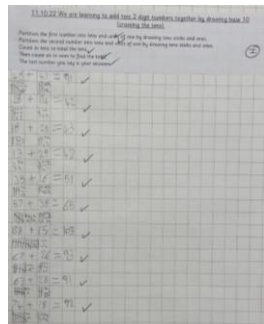
The part-part whole model is also used as a strategy for partitioning.



Y2

Children will begin to add multiples of 10 using their knowledge of place value.

Children will begin to add two, 2 digit numbers using partitioning and recombining. Children will start by using base 10 to help them to add two 2 digit numbers. Children will then move on to drawing their base 10 and will then move on to using the strategy of partitioning and recombining. Children will add the tens first, then the units. Finally they recombine.

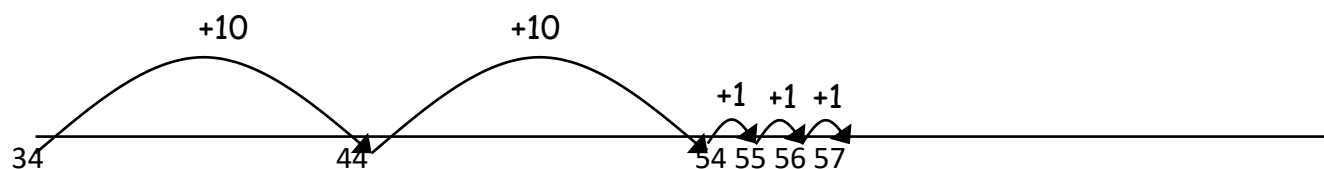


$$\begin{aligned} 42 + 31 &= \\ 40 + 30 &= 70 \\ 2 + 1 &= 3 \end{aligned}$$

Children will then begin to use 'empty number lines' themselves starting with the larger number and counting on.

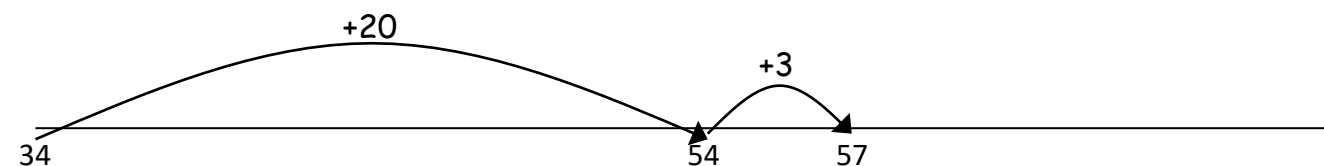
- ✓ First counting on in tens and ones.

$$34 + 23 = 57$$



- ✓ Then, when appropriate children are shown how to become more efficient by adding the tens in one go, then the units.

$$34 + 23 = 57$$



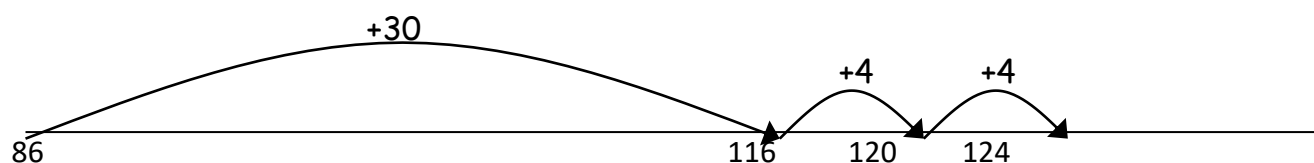
- ✓ Children move on to solving addition calculations which require bridging through 10.

$$87 + 15 = 102$$



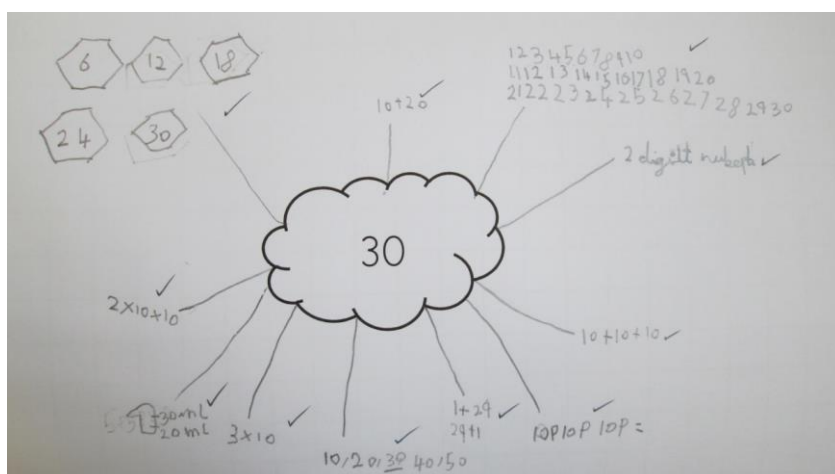
Children will continue to use empty number lines with increasingly large numbers. They will count on from the largest number irrespective of the order of the calculation.

$$38 + 86 = 124$$



Children are always encouraged to look for number bonds/number facts to help them solve any addition calculation quickly and efficiently.

Throughout school children are encouraged to represent number in different ways. This is recorded as a 'Number of the Week' where children explore a particular number and represent this in as many ways as they can.



Y3

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

Option 1 – Adding most significant digits first, then moving to adding least significant digits.

$$\begin{array}{r} 67 \\ + 24 \\ \hline 80 \text{ (60 + 20)} \\ 11 \text{ (7 + 4)} \\ \hline 91 \end{array}$$

$$\begin{array}{r} 267 \\ + 85 \\ \hline 200 \\ 140 \text{ (60 + 80)} \\ 12 \text{ (7 + 5)} \\ \hline 352 \end{array}$$

Moving to adding the least significant digits first in preparation for 'carrying'.

$$\begin{array}{r} 67 \\ + 24 \\ \hline 11 \text{ (7 + 4)} \\ 80 \text{ (60 + 20)} \\ \hline 91 \end{array}$$

$$\begin{array}{r} 267 \\ + 85 \\ \hline 12 \text{ (7 + 5)} \\ 140 \text{ (60 + 80)} \\ 200 \\ \hline 352 \end{array}$$

Option 2 - Adding the least significant digits first

$$\begin{array}{r} 67 \\ + 24 \\ \hline 11 \text{ (7 + 4)} \\ 80 \text{ (60 + 20)} \\ \hline 91 \end{array}$$

$$\begin{array}{r} 267 \\ + 85 \\ \hline 12 \text{ (7 + 5)} \\ 140 \text{ (60 + 80)} \\ 200 \\ \hline 352 \end{array}$$