Progression In Calculations at Lyndhurst Infant School

LYNDHURST INFANT SCHOOL

Addition and Subtraction

Mathematical Calculations in School Today.

This document is designed to help you to understand the calculation methods your child will be taught in school. When supporting your child at home with Maths work it would be helpful if you could reinforce these methods rather than teach them the way that you were taught. Please speak to you child's teacher to find out which methods would currently be the most appropriate for your child to practice at home.

Remember each child will progress at their own pace.

Understanding Addition and Subtraction

Explanation

The physical act of counting out a set number of objects, and combining two groups or taking some away, is an important step for children to explore. This is best done in a practical play based context as much as possible.

Use a Numicon shape and add on the 1 shape… What number do you have now? Find the new Numicon shape to cover over the top.

Count out a given number of objects and take away 1 of them… How many do you have now?

Understanding addition as combining two groups

Children need to experience counting out a set of objects and combining them with another set of objects to make a total amount. Initially this needs to be adding 1 more to numbers up to 10, then 20.

Explore 1 more through simple songs and rhymes, for example '1 man went to mo' or '1, 2, 3, 4, 5, once I caught a fish alive'.

Understanding subtraction as taking away

Children need to experience counting out a set number of objects and then removing/taking away a certain number from that group. Initially this needs to be taking away 1 from a set of up to 10 and then 20.

Explore 1 less through simple songs and rhymes, for example '10 green bottles' or '5 little speckled frogs'.

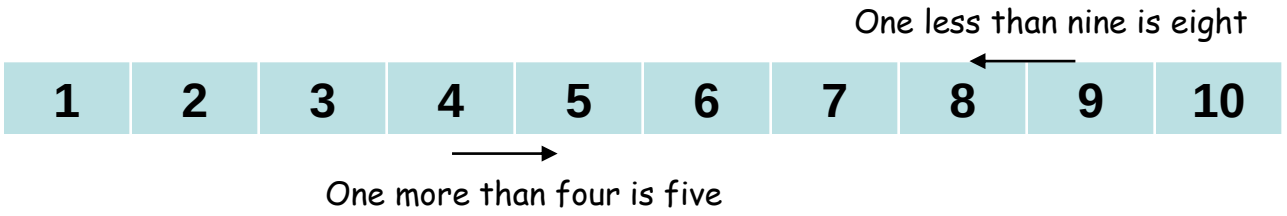
Key Questions/Vocabulary

More, more than, one more, after, add, plus, count, total, equals, makes
Less, less than, one less, before, take away, subtract, leaves,
What is the number after 6? What is the number before 9?
How will you find out how many there are in total/left?
Can you show me how you worked out 1 more than/1 less than…..?

Progression

- Start by adding and taking away 1 from a number up to 10, then up to 20
- Progress to adding/taking away more than 1 within the same number ranges

Using a Number Track for Addition and Subtraction



Explanation
Number tracks can be used to help a child locate a number in a sequence, learn the order of numbers, and begin to find one more or one less than a given number. Once they understand the direction of movement for addition and subtraction they can progress to finding more than 1 more or less

Children need to be able to understand the order of numbers remains the same and that as we count on the numbers get bigger by 1 and as we count back the numbers get smaller by 1. They need plenty of practise in counting objects and by rote.
Counting on: Count the stairs as you go up to bed... Count your footsteps as you walk across a room.... Write the numbers to 10 on separate pieces of paper and get your child to put them into order, counting to check., then progress to ordering numbers to 20.
Counting back: Count back as you go down the stairs.... Do a countdown from 10 or 20 before you leave the house....Write the numbers to 10 on separate pieces of paper and get your child to order them in reverse, then try from 20.

Begin to know + and – facts within 5.
Begin to recall pairs of numbers that total 10.
Begin to know doubles up to double 5.

Key Questions/Vocabulary

Count on, add, more, one more, more than, equals, totals, makes

Count back, take away, subtract, one less, less than, leaves

Find the number that is *one more/less than...?*

Find the number that is 4 more/less than...?

Count on/back 3 places from 15, where do you land?

How many is 5 more/less than 8?

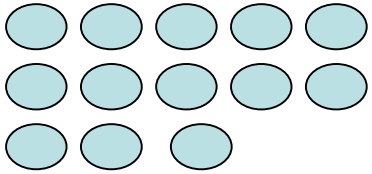
Order Numicon 1 – 10 set, place a shape on top of the next one, noticing how there is a difference of 1.

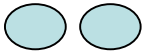
Progression

- Start by adding and taking away 1 from a number up to 10, then up to 20
- Progress to adding/taking away more than 1 within the same number ranges

Simple Jottings/Mark Making for Addition

13 + 2 = 15





Begin to know + and – facts within 5.
Begin to recall pairs of numbers that total 10.
Know doubles up to double 5.

Explanation

Simple mark making is the first stage of children's independent jottings to help them solve additions. They draw or make the appropriate number of marks under each number then count them up to reach the total. It is not necessary to draw the number of marks under the answer. Children can also use objects, such as counters, sweets, beads or cubes to create groups to combine to find the total of an addition.

Key Questions/Vocabulary

Count, count on, more, add, plus, sum, altogether, total, equals

How many altogether?

Find the number that is *five more than...?*

Count on 6 more from 13, what number do you get to?

Children need to begin to see that addition produces the same answer which ever way round it is solved eg 8 + 2=10 and 2+8=10.

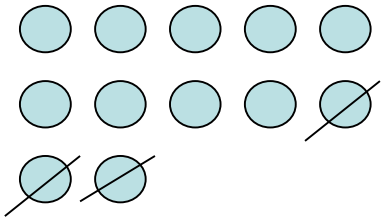
It is COMMUTATIVE. Lay the 8 and 2 Numicon shapes together and place another 2 then 8 on top to see it is the same. Encourage children to see that it is easier and quicker to count on from the largest number.

Progression

- Initially work with numbers up to 20
- Once children are confident counting beyond 20 and understand the place value of the digits in a 2-digit number, more efficient methods can be taught

Simple Jottings/Mark Making for Subtraction

12 - 3 = 9



Begin to know + and – facts within 5.
Begin to recall pairs of numbers that total 10.
Know doubles up to double 5.

Explanation

Simple mark making is the first stage of children's independent jottings to help them solve subtractions. They draw the initial number of objects and then cross off the number it says to take away and count the ones left over. Children can also use objects, such as counters, sweets, beads to create the initial group and then physically take away the right number to find the answer to the subtraction.

Key Question/Vocabulary

Count, count back, subtract, take away, cross off
Difference between, leaves, equals
How many are left over?
Find the number that is *6 less than…?*
Count back 5 from 16, what number do you get to?

At this level, children need to see that when doing subtraction the biggest number needs to be first and you take away the smaller number.

Progression

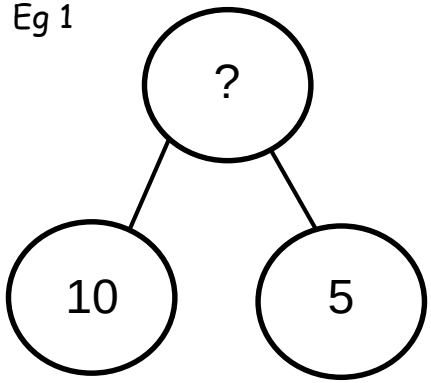
- Initially work with numbers up to 20
- Once children are confident counting beyond 20 and understand the place value of the digits in a 2-digit number, more efficient methods can be taught

Part-Part-Whole Models

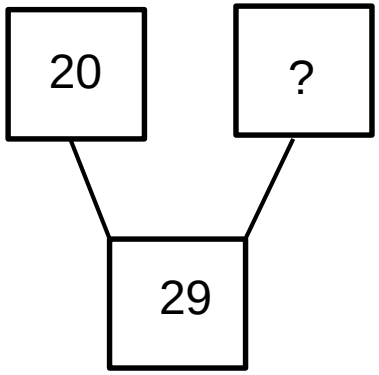
Explanation

A part-part-whole model shows the relationship between the whole number and it's parts, and is a clear way for children to see the relationship between addition and subtraction. It is important for the models to be represented in different ways as shown in these examples. Try to get children to recall known facts to support their thinking. Ensure conceptual variation by looking at part-part-whole models alongside number lines and using known facts.

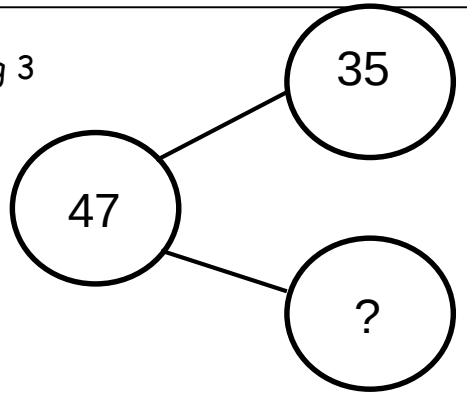
Eg 1



Eg 2



Eg 3



Key Questions/Vocabulary

Part, whole, combine, add, plus, subtract, take away, minus, equals, makes, total, altogether

What is this part? What is the whole?

What do I add to this part to make this whole?

If this is the whole and this is a part, what is the other part?

Know addition facts for numbers within 10.
Rapidly recall all pairs of numbers that have a total of 10.
Begin to know doubles up to double 10 and corresponding halves.

Progression

- To understand the model, show both parts completed and children have to combine them to find the whole. Begin with tens and units splits (Eg1)
- Progress to tens and unit splits where a part is missing to make the link to subtraction (Eg2)
- Move on to any 2 digit number as the whole or related parts (Eg3)

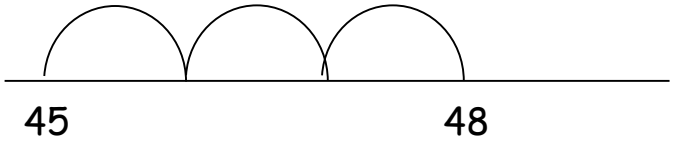
Using a Blank Number Line for Addition and Subtraction

Explanation

Blank number lines are used to enable children to count on and back with more than one jump. Children are taught to draw their own number line and start with the biggest number on the left for addition and the right for subtraction. There is no need to write +1 or -1 in each jump. Children learn to use ones jumps, adding and taking away single digit numbers and working within a range up to about 30 to begin with. It is only necessary to record where they start and where they end up after adding/subtracting. Remember to jump on/back from the biggest number! Ensure conceptual variation by looking at number lines alongside part-part-whole models and using known facts.

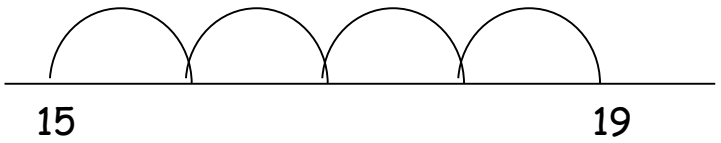
45 + 3 = 18

Jump this way



19 – 4 = 15

Jump this way



Know addition facts for numbers within 10.
Rapidly recall all pairs of numbers that have a total of 10.
Begin to know doubles up to double 10 and corresponding halves.

Key Questions/Vocabulary

Count on, count on in ones, add, plus, more than, total,
Count back, count back in ones, less than, take away,
Subtract, leaves, equals, makes
Which number are you starting with?
How many ones jumps do you need to do? Which direction?
What number have you reached?

Children can use Deines (one blocks) to place in the jumps and support the visual image of how many they need to add on/take away.

Progression

- Add and subtract single digits within a range of up to about 30 to begin with
- Progress to adding and subtracting numbers (up to 12) within a range up to 100 (ensure it is within the child's counting range)
- Do not expect children to use this method with +/- numbers larger than about 12 as this would become inefficient

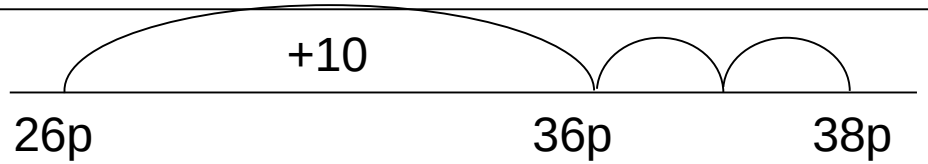
Adding and Subtracting Tens and Ones On A Number Line

Explanation

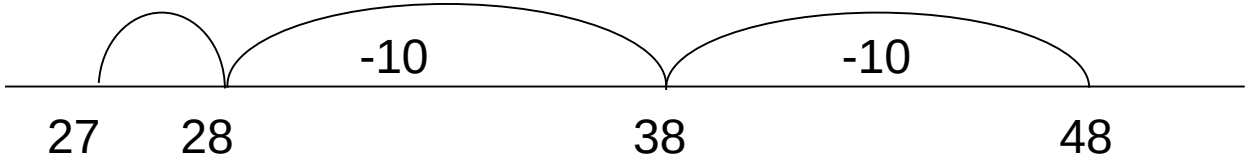
Children need to understand the place value of each digit in order to use this method and be able to partition 2-digit numbers into tens and ones. Explore the patterns of adding and subtracting tens on a 100 square to reinforce the fact that the units digit remains the same. Ensure conceptual variation by looking at number lines alongside part-part-whole models and using known facts.

Know related subtraction facts for numbers within 10. Know doubles up to double 10 and their corresponding halves.

26p + 12p = 38p



48g – 21g = 27g



Key Questions/Vocabulary

Addition, add, plus, more, more than, ten more, count in tens, one more, count in ones, total, equals, altogether

Subtract, take away, minus, less than, ten less, count back in tens, one less, count back in ones,

How many tens jumps do you need to do?

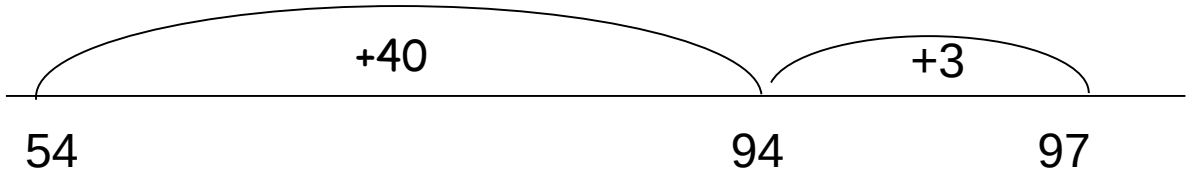
How many ones jumps do you need?

Progression

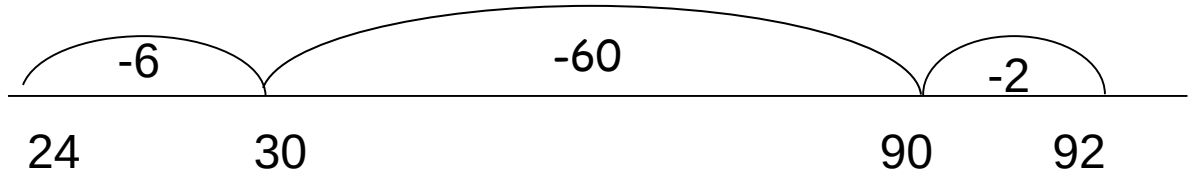
- Begin by adding/subtracting teen numbers, where the units do not cross the tens boundary (eg 67 – 14? 55 + 13?)
- Progress to +/- larger 2 digit numbers that do not cross the tens boundary (eg 25 + 43? 78 – 42?)
- Finally progress to +/- 2-digit numbers where the units do cross the tens boundary (eg 82 – 33? 36 + 56?)

Develop Efficient Use of Number Lines

54 + 43 = 97



92 – 68 = 96



Explanation

Once children are confident and accurate in the use of tens and ones jumps, they can progress to using multiple of tens jumps. Encourage children to use their knowledge of number bonds to bridge to the nearest multiple of 10 to make counting easier (as in the second eg). Make sure they keep a record in their jumps of what they are doing so that they can check they have + or – the correct number.

Key Questions/Vocabulary

Addition, add, plus, more, more than
Subtract, take away, minus, less than
Ten more, ten less, count in tens
One more, one less, count in ones
Difference between, inverse
Equals, leaves, altogether

Know related subtraction facts for numbers within 10. Know doubles up to double 10 and their corresponding halves.

Progression

- When looking at the number being added on or subtracted, begin by doing 'chunky jumps' of tens and then single units jumps
- Progress to bridging through tens boundaries with 'chunky jumps' of the units

Using Known Facts for Addition and Subtraction

Explanation

Children need to be able to apply the facts that they know to support more efficient calculating. It is important that procedural variation is used frequently to help children make connections and see patterns with the facts that they know and other calculations. Ensure conceptual variation by looking at known facts alongside part-part-whole models and number lines.

63 + 6 = ?

3 + 6 = 9
13 + 6 = 19
23 + 6 = 29
33 + 6 = 39
43 + 6 = 49
53 + 6 = 59

8 + 9 = ?

"I know that double 8 is 16 so 1 more makes it 17"

78 – 4 = ?

"I know that 8 minus 4 is 4 because double 4 is 8. So 78 – 4 must be 74"

54 + 6 = ?

"I know that 4 + 6 is 10 so 54 + 6 must be the next tens number, 60"

Key Questions/Vocabulary

Double, half, near double, pairs to 10,

Tens, units, ones, add, plus, subtract, minus, take away, total, makes, equals

Do you know a fact that could help you?

Is it a near double?

Recall all + and – facts for each number within 10 and use to reason bonds to and within 20.
Know doubles up to double 10 and their corresponding halves.

Progression

- Encourage children to apply their knowledge of doubles and halves as well as pairs to 10
- Progress to applying other known addition and subtraction facts as well as near doubles

Partition and Recombine for Addition

Explanation

Once children are secure with place value, some find this strategy a quick and easy method for addition, that they are soon able to do mentally. It is important to follow the progression guidance below for understanding this method and how to record it. Some children will be able to do this method for additions that do not cross the tens boundary but will find other methods easier when the calculations do cross the tens boundary.

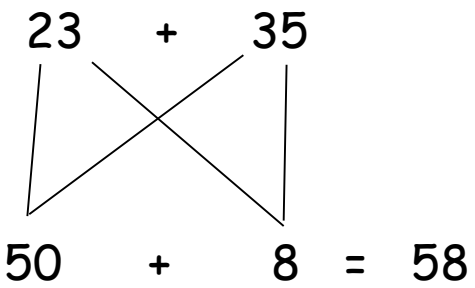
To add 23 and 35....First add the number of tens,

so 20 + 30 = 50

Then add the number of ones, so 3 + 5 = 8

Finally combine the answers to give the total,

so 50 + 8 = 58



Key Questions/Vocabulary

Tens digit, ones digit, units
Partition, split, recombine
How many tens? How many ones?
How many altogether?

Recall all + and – facts for each number within 10 and use to reason bonds to and within 20.
Know doubles up to double 10 and their corresponding halves.

Progression

•.Begin with calculations where the units do not cross the tens boundary
• Progress to calculations where the units do cross the tens boundary (eg 37 + 26.
So 30 + 20 = 50
7 + 6 = 13
Then 50 + 13 = 63