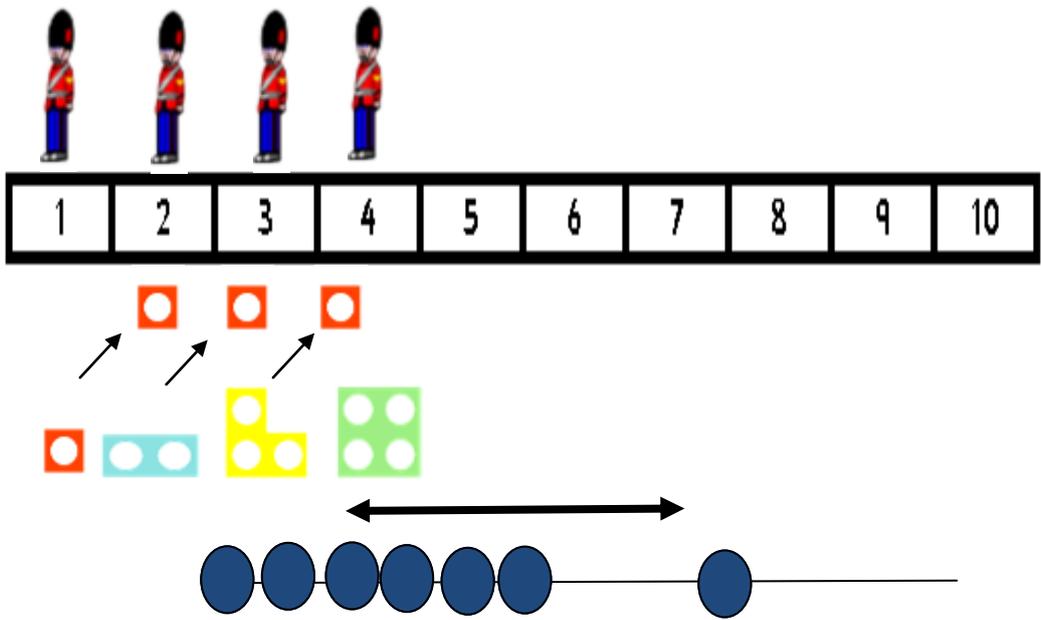


Notes Progression for Mental Subtraction St Agnes Primary

DEVELOPING COUNTING WITH UNDERSTANDING

- Count forwards and **backwards** in ones to at least 20 using practical equipment and a number track .
- Give one more and **one fewer/less** for numbers to 20 demonstrating understanding using practical equipment.

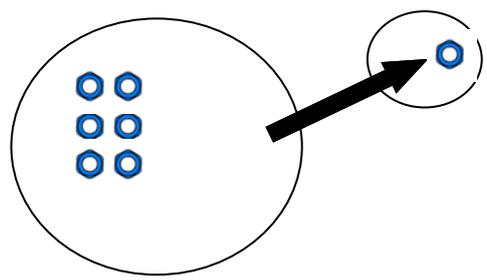


- One number name is given to each object e.g. two objects being incorrectly named as 'sev—ern'

DEVELOPING UNDERSTANDING AND MENTAL METHODS:

- Uses developing mathematical ideas and methods to solve practical problems involving **counting** and **comparing** in a real or role play context using models and images to support learning.

$7 - 1 = 6$



Notes

Progression for Mental SubtractionDEVELOPING UNDERSTANDING AND MENTAL METHODS:

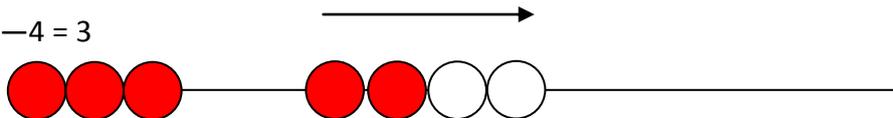
- Uses subtraction board, bead strings, fingers, number tracks and mathematical imagery and pattern within number e.g. Numicon shapes, to locate numbers quickly and is beginning to use vocab. involved in subtraction (take away, leave, how many are left? How many have gone? One fewer/less, two fewer/less, how many fewer/less is ...than...? difference between).
- Solve problems in everyday life in the classroom, or in role play. Make decisions about what to do. Explain orally and where appropriate, record the solution in child's own way, for example, can answer questions such as:

What is this number? Which is fewer/less: 4 or 7?

What number: comes before 10, is one fewer/less than 5, 12 etc.

- Say how many are left when some are taken away by counting how many are left or by counting back from the number.
- Uses related vocab. and symbols to describe and record subtraction number sentences.
- Recognises that subtraction cannot be done in any order and the bigger number must be first.
- Subtracts one digit numbers from one and two digit numbers using the bead string, number track or labelled number line by **stepping**.

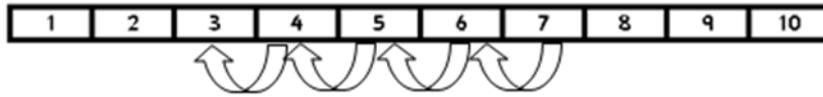
$$7 - 4 = 3$$



Children develop their ability to record progressively using:

- concrete objects and pictorial representations
- concrete objects, pictorial representations, word and numeral cards
- concrete objects, pictorial representations, numeral and symbol cards, can create a number sentence
- concrete objects, pictorial representations, can explain with understanding and write the related number sentence using numerals and symbols

When using a number line for subtraction, stepping and jumping should be underneath the line.

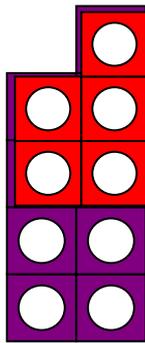


When children demonstrate 1:1 correspondence up to 30 - move onto the fully marked and labelled number line.



COUNTING ON AND BACK TO FIND THE DIFFERENCE

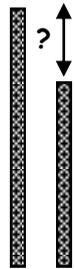
$9 - 5 = 4$



NOTE:
WHEN SUBTRACTING 2 ODD NUMBERS MATCH THE SHAPES UP AT THE TOP SO CHILDREN CAN SEE WHICH NUMICON 'SHAPE' IS LEFT.

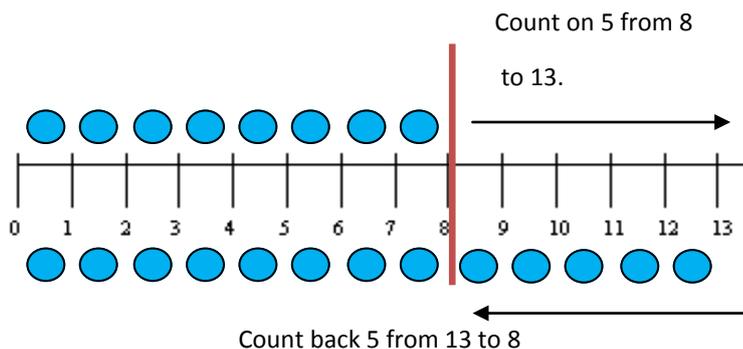


and



- Children begin to use the number line to count on and back in ones to find the difference.
- Begin to interpret situations as subtraction calculations and explain their reasoning, for example they answer questions such as:

Kim has 8 bean bags but she wants 13. How many more bean bags does she need?



Here we are taking off what we have got and counting on to find out how many more we need.

Here we have 13 bags and we count back to how many we have got to find out how many more we need.

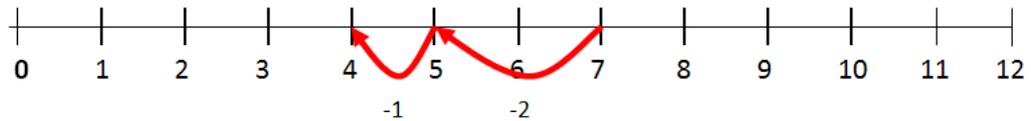
In **both** cases we are finding the difference between 8 and 13.

MENTAL METHODS: PARTITIONING

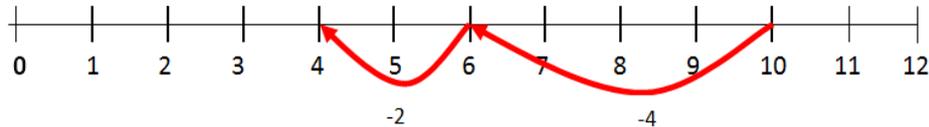
The methods illustrated here are based on partitioning and a developing knowledge and recall of subtraction facts as they lead into the later stages of progression in the written method.

BRIDGING

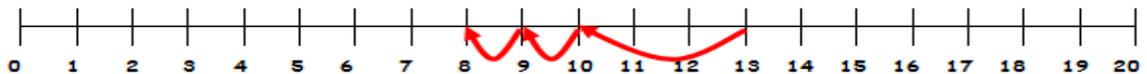
With developing recall of number facts and '5 and a bit' subtract a pair of numbers mentally by **jumping** on a number line. $7-3 = 4$

BRIDGING THROUGH 5

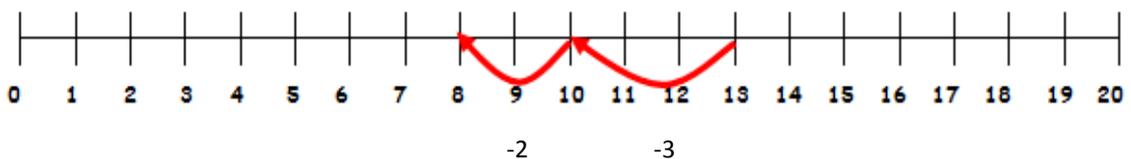
- Children use both **hands** to show subtraction calculations of all numbers to 10 including using the '5 plus structure' (as in the ten frame image).
- Reinforce the calculation using the bead string and Numicon imagery.
- Understands that more than two numbers can be subtracted from a total e.g. $10-4-2 = 4$.

Bridging through 10 using a number line.

$$13 - 5 = 8$$



Children can become more efficient by using known number facts to count back. For example, they know $2 + 3 = 5$ so can use this fact to bridge through 10.



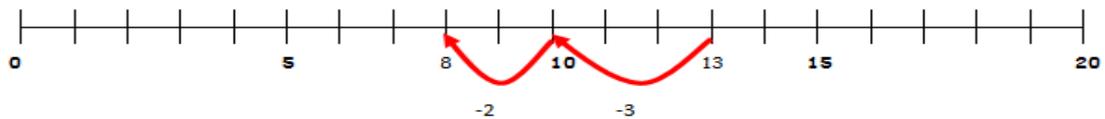
For children to move towards the use of an empty number line, before removing support, ensure they can order and position numbers on a line.

With this understanding and when children are reliably jumping begin to remove some of the support provided by the fully marked and labelled number line.

Subtract a pair of numbers mentally by jumping and bridging through 10

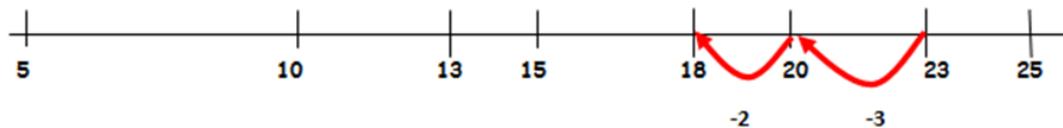
- Jumping and bridging through 10

$$13 - 5 = 8$$



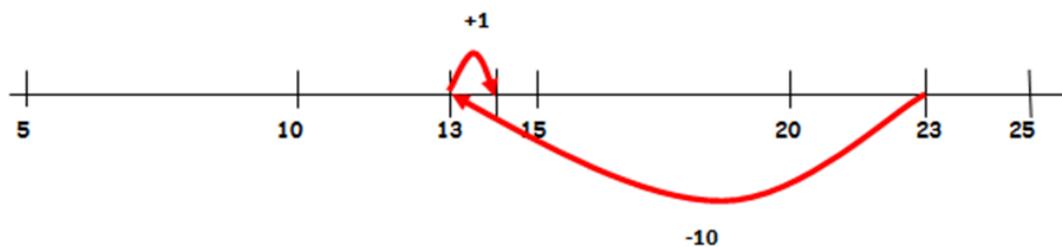
Move on to a partially marked and labelled number line as soon as possible

- Jumping and bridging through 20 $23 - 5 = 18$



- Subtract a multiple of 10 and adjust by 1 (rounding and adjusting/ compensation)

$$23 - 9 = 14$$



PARTITIONING IN DIFFERENT WAYS

- Encourage children to practise the skill of partitioning numbers in different ways e. g.

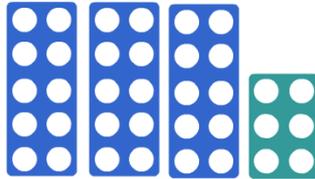
$$47 = 40 + 7$$

$$30 + 17$$

$$20 + 27$$

MENTAL METHODS: PARTITIONING INTO COMPONENT PARTSSubtracting two 2-digit numbers — using Numicon

Children can collect the correct Numicon shapes for the first number (36) and then subtract the second number (21).



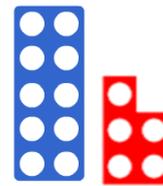
$$36 - 21 =$$

In this example the children have subtracted the tens first and then the units. When children are working mentally with equipment they may do it in a variety of ways.

$$36 - 20 = 16 \quad 16 - 1 = 15$$



$$36 - 20 = 16$$



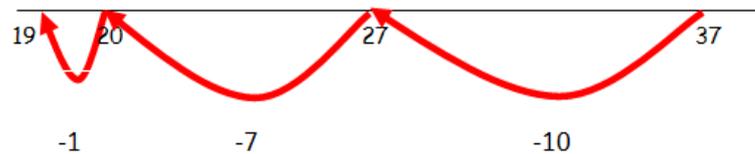
$$16 - 1 = 15$$

$$37 - 18 =$$

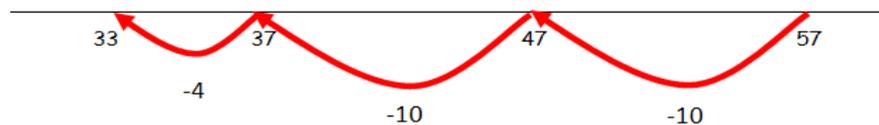
When using an empty number line children only partition the second number.

$$37 - 10 = 27$$

$27 - 8 = 19$ Bridging through ten can help children become more efficient



$$57 - 24 = 33$$



PROBLEM SOLVING

Encourage children to use the number line for solving problems involving money, measures and time. See page 8 for examples.

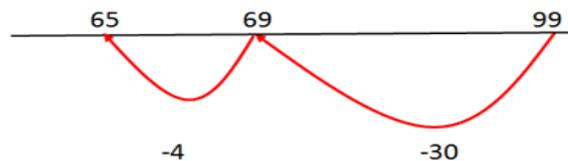
Children are continuing to subtract using their mental methods asking themselves the question: **Which mental method should I use?** They will look at the numbers in the calculation in order to make a decision about whether to use:

- Partitioning
- Counting on to find a small difference (when the numbers are close together for example $76-72$)
- Compensation (rounding and adjusting)

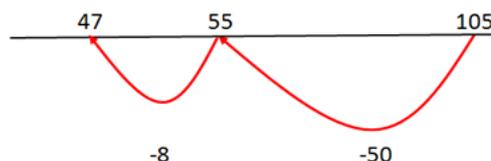
Partitioning

When there is nothing special about the numbers, children will use partitioning. They will use different sized jumps depending on their level of confidence and efficiency.

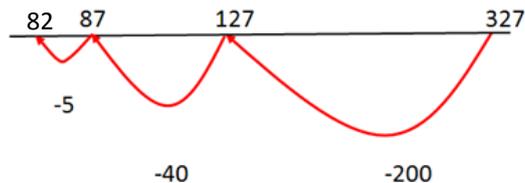
$$99 - 34 = 65$$



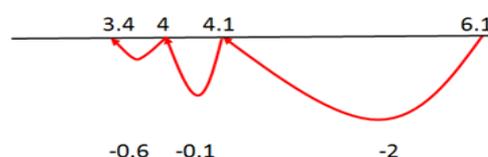
$$105 - 58 = 47$$



$$327 - 245 = 82$$

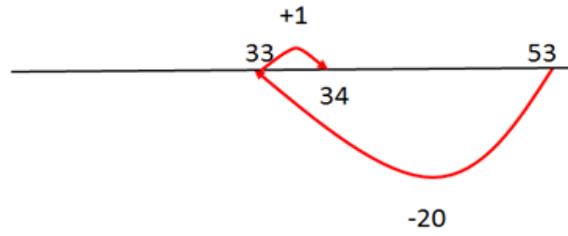


$$6.1 - 2.7 = 3.4$$

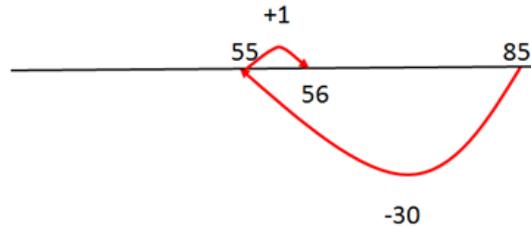


COMPENSATION (Rounding and adjusting)

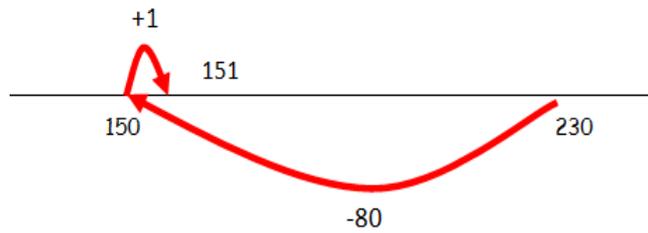
$53 - 19 = 34$



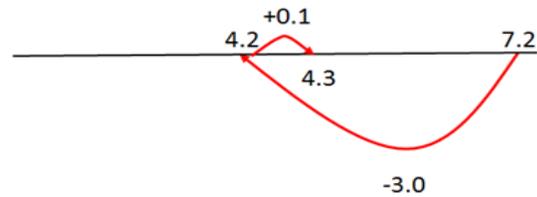
$85 - 29 = 56$



$230 - 79 = 151$



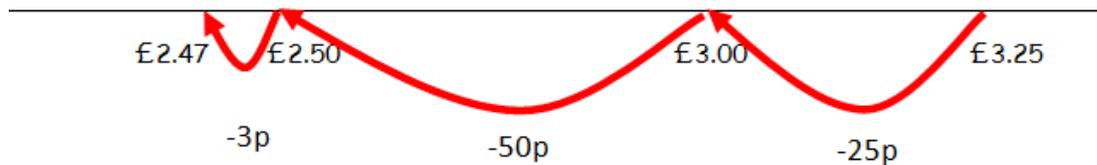
$7.2 - 2.9 = 4.3$



Problem Solving

Until children are confident when using a **written method** for subtraction and have understanding of decimals they should be encouraged to subtract sums of money or measures using the number line.

£3.25—78p or 3.25m—78cm



Encourage children from all year groups to **always** use the number line when solving problems involving time.

Sarah arrived at the shops at 10.45am. She had left her house 35 minutes before. What time did she leave? Answer: 10.10 am

