Find out how we teach:

Mental Maths

- Addition & Subtraction

A Parent's Guide

The ability to calculate 'in your head' is an important part of mathematics and an important part of coping with maths in everyday situations. The national curriculum makes it clear that children should learn number facts by heart and be taught to develop a range of mental strategies for quickly finding from known facts a range of related facts that they cannot recall rapidly. There are several ways of carrying out calculations and a mental approach is often the most efficient and needs to be taught explicitly.

This pdf offers guidance on the strategies and the number facts children need to apply to become numerate. We aim to teach children to continually REASON about the numbers and allow them to grow to understand which strategies are the best.

MENTAL STRATEGIES FOR ADDITION AND SUBTRACTION

There are many different ways of adding and subtracting; to do both efficiently 'in our head', children need to be able to use and apply the following strategies:

- Counting forward and backwards
- Reordering
- Partitioning
- Bridging
- Compensating
- Using doubles and near doubles
- Number bonds

Counting forward and backwards

The image of a number-line helps children to appreciate the idea of counting forward and back, it allows them to recognise patterns and relationships too.

In KS1 children are encouraged to count on and back in ones, twos and tens. This moves on in KS2 to counting on and back in 100's and steps of 3, 4, 5 etc. In the upper juniors, the children learn to count in decimals and fractions:

- ***KS1***

4 + 8 >>> **(count on in ones from 8)**	7 - 3 >>> **(count back in ones from 7)**
14 + 3 >>> **(count on in ones from 14)**	27 - 4 >>> **(count back in twos from 27)**

- ***KS2***

40 + 30 >>> **(count on in tens)**	90 - 40 >>> **(count back in tens)**
73 - 68 >>> **(count on in twos to 70 & one 3)**	35 - 15 >>> **(count back in fives)**
1½ + ¾ >>> **(count on in quarters)**	1.7 + 0.5 >>> **(count on in tenths)**

Reordering

Calculations can be made easier by changing the order of numbers. How children order will depend on number facts they have already learned. Children will apply number bond facts and their understanding of bridging -

- ***KS1***

2 + 7 >>> **7 (count on 2)**	5 + 13 >>> **13 + 5 (count on 5)**
3 + 4 + 7 >>> **7 + 3 (bond to 10 + 4)**	13 + 21 + 13 >>> **13 + 13 + 21 (double 13)**
23 + 54 >>> **54 + 23 (larger number first) > count on numberline**	

- ***KS2***

17 + 9 - 7 >>> **17 - 7 + 9**	28 + 75 >>> **75 + 28 (28 = 25 + 3)**
58 + 47 - 38 >>> **58 - 38 + 47**	200 + 567 >>> **567 + 200**
1.7 + 2.8 + 0.3 >>> **1.7 + 0.3 + 2.8 (bonds to 1)**	180 + 650 >>> **650 + 180 (180 = 150 + 30)**
4.6 + 3.8 + 2.4 >>> **4.6 + 2.4 + 3.8 (bonds)**	8.7 + 5.6 - 6.7 >>> **8.7 - 6.7 + 5.6**

Partitioning (Part 1)

It is essential for children to know that numbers can be partitioned into, for example, hundreds, tens and ones. In this way numbers are seen as wholes rather than a collection of single digits in columns.

- ***KS1***

30 + 47 >>> **30 + 40 + 7**

78 - 40 >>> **70 - 40 + 8**

25 + 14 >>> **20 + 10 + 5 + 4**

- ***KS2***

55 + 37 >>> **55 + 30 + 7 = 85 + 7**

43 + 28 + 51 >>> **40 + 3 + 20 + 8 + 50 + 1**

365 - 40 >>> **300 + 60 + 5 - 40 / 300 + 60 - 40 + 5**

74 - 38 >>> **74 - 30 - 8**

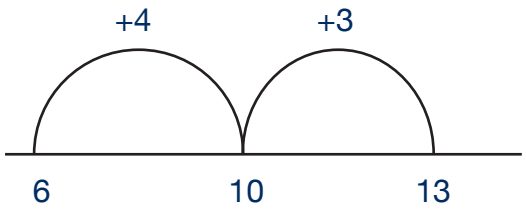
5.6 + 3.7 >>> **5.6 + 3 + 0.7 = 8.6 + 0.7**

4.7 - 3.5 >>> **4.7 - 3 - 0.5**

Partitioning (Part 2) - Bridging

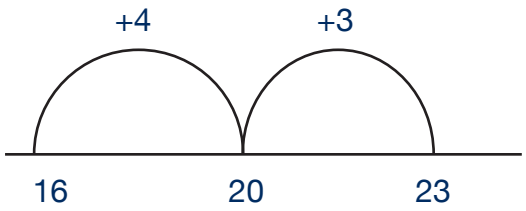
An important aspect of having an appreciation of number is to know when a number is close to 10 or a multiple of 10 e.g. to recognise 47 is 3 away from 50 or 96 is 4 away from 100. The use of an empty number-line where multiples of 10 are seen as 'landmarks' is helpful and enables children to have an image of jumping forwards or backwards to these 'landmarks' e.g.

6 + 7 >>> **6 + 4 + 3**



In the case of subtraction, bridging through the next 10 or multiple of 10 is useful, it is just like a shopkeeper giving change - again the empty number-line can give an image for this method e.g.

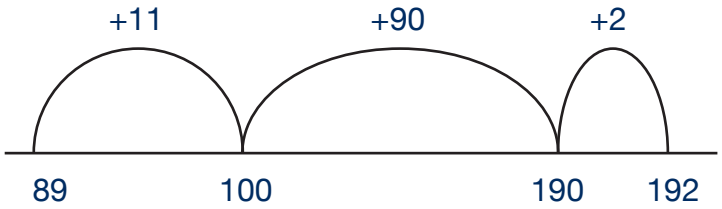
23 - 16



answer is 7

This method is built up with more difficult numbers

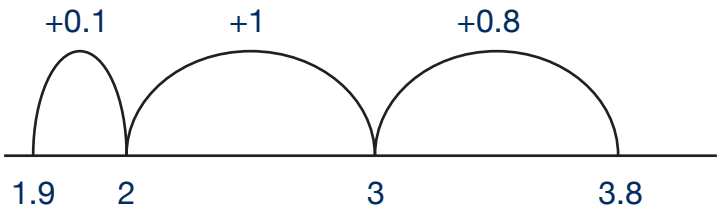
192 - 89



answer is 103

and decimals

3.8 - 1.9



answer is 1.9

- ***KS1***

6 + 7 >>> **6 + 4 + 3**

23 - 9 >>> **23 - 3 - 6**

15 + 7 >>> **15 + 5 + 2**

- ***KS2***

49 + 32 >>> **49 + 1 + 31**

57 + 14 >>> **57 + 3 + 11**

3.8 + 2.6 >>> **3.8 + 0.2 + 2.4**

5.6 + 3.5 >>> **5.6 + 0.4 + 3.1**

296 + 134 >>> **296 + 4 + 130**

0.8 + 0.35 >>> **0.8 + 0.2 + 0.15**

Partitioning (Part 3) - Compensating or adjusting

This strategy is for numbers that are close to a multiple of 10, numbers ending in 1, 2, 8 or 9.

- ***KS1***

5 + 9 >>> **5 + 10 - 1**

34 + 9 >>> **34 + 10 - 1**

52 + 21 >>> **52 + 20 + 1**

70 + 9 >>> **70 + 10 - 1**

- ***KS2***

53 + 11 >>> **53 + 10 + 1**

84 - 19 >>> **84 - 20 + 1**

53 + 29 >>> **53 + 30 - 1**

138 + 69 >>> **138 + 70 - 1**

405 + 399 >>> **405 + 400 - 1**

2½ + 1¾ >>> **2½ + 2 - ¼**

5.7 + 3.9 >>> **5.7 + 4.0 - 0.1**

Partitioning (Part 4) - Using near doubles

- ***KS1***

5 + 6 >>> **(is double 5 add 1)**

40 + 39 >>> **(is double 40 subtract 1)**

13 + 14 >>> **(is double 14 subtract 1)**

- ***KS2***

60 + 70 >>> **(is double 60 add 10)**

1.5 + 1.6 >>> **(is double 1.5 add 0.1)**

Partitioning (Part 5) - Bridging through numbers other than 10

- ***KS1***

1 week >>> **7 days**

What time will it be in one hour?

It is half past 3. What time was it 3 hours ago?

How long is it from 2 o'clock to 6 o'clock?

10.30 to 10.45

9.45 to 10.15

- ***KS2***

40 minutes after 3.30

50 minutes before 1.00pm

It is 9.45. How many minutes to 10.00 / 10.10

Increasing complexity of bridging