St.Meriadoc
CE Junior Academy

Written progression through addition

MENTAL CALCULATIONS

These are a selection of mental calculation strategies:

Mental recall of number bonds

6 + 4 = 10   □ + 3 = 10

25 + 75 = 100   19 + □ = 20

Use near doubles

6 + 7 = double 6 + 1 = 13

Addition using partitioning and recombining

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

Counting on or back in repeated steps of 1, 10, 100, 1000

86 + 57 = 143 (by counting on in tens and then in ones)

460 - 300 = 160 (by counting back in hundreds)

Compensation by adding the nearest multiple of 10, 100 and 1000 and adjust

24 + 19 = 24 + 20 – 1 = 43

458 + 71 = 458 + 70 + 1 = 529

Use the relationship between addition and subtraction

36 + 19 = 55   19 + 36 = 55

55 – 19 = 36   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 OUR CHILDREN TO ACHIEVE.

# Key representations to support conceptual understanding of addition and subtraction.
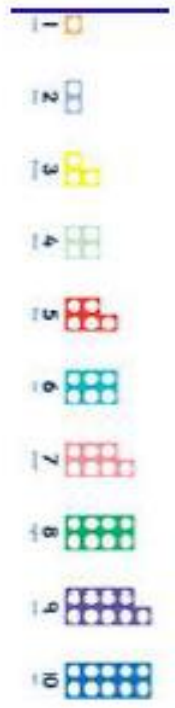
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

36…46, 56, 66

76…66, 56, 46

6 + 10 = 16
16 + 10 = 26
26 + 10 = 36
36 + 10 = 46
36 + 20 = 56
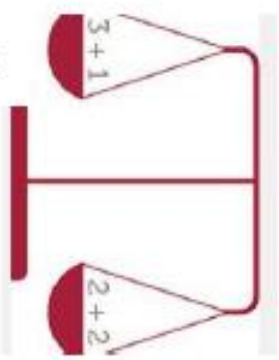
96 − 10 = 86
86 − 10 = 76
76 − 10 = 66
&c.
76 − 30 = 46
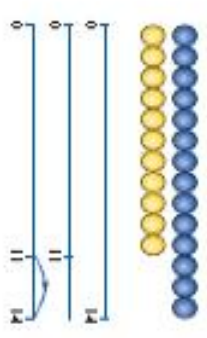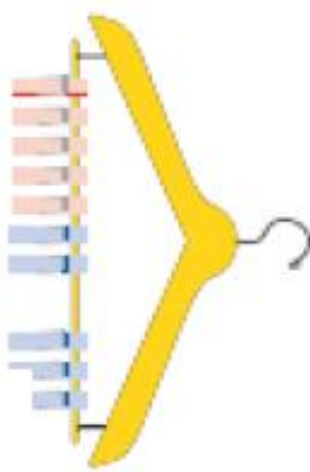
The difference between 11 and 14 is 3.
14 − 11 = 3
11 + □ = 14

$10 = 7 + 3$

$15 + 5 = 20$

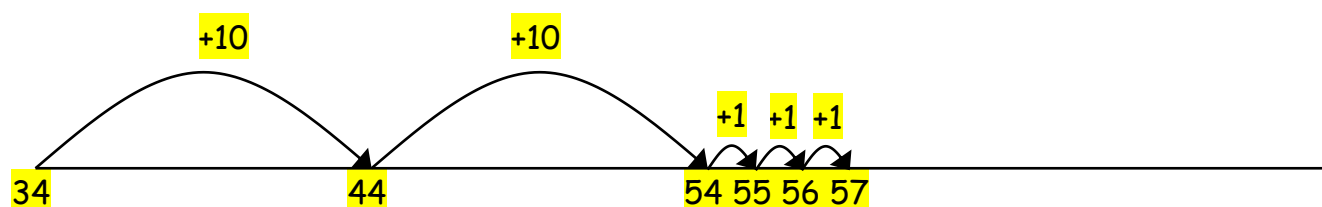$8 + ? = 10$

3 + 1   2 + 2

PROGRESSION THROUGH CALCULATIONS FOR ADDITION

Stage 1 – Number line

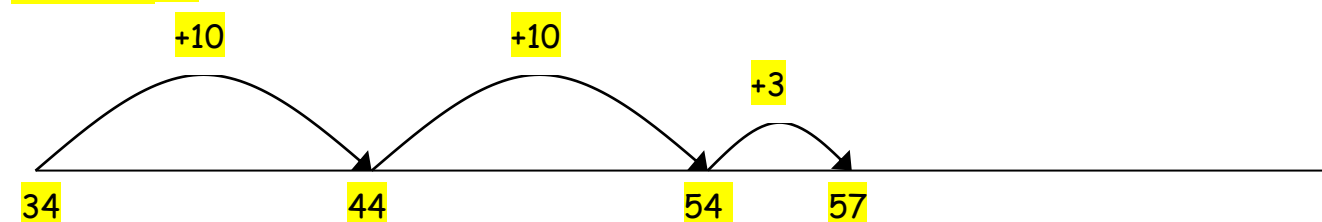Children will begin to use 'empty number lines' themselves starting with the larger number and counting on.
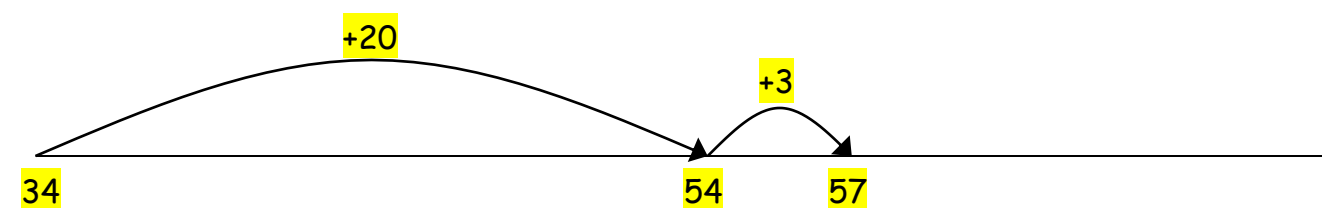
✓   First counting on in tens and ones.

34 + 23 = 57

✓   Then helping children to become more efficient by adding the units in one jump (by using the known fact 4 + 3 = 7).
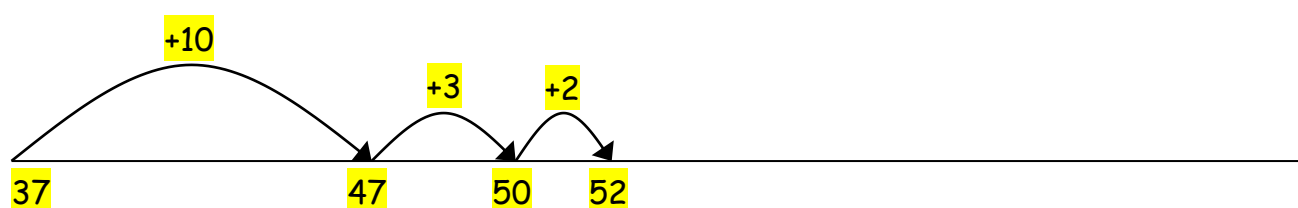
34 + 23 = 57

✓   Followed by adding the tens in one jump and the units in one jump.

34 + 23 = 57

✓   Bridging through ten can help children become more efficient.
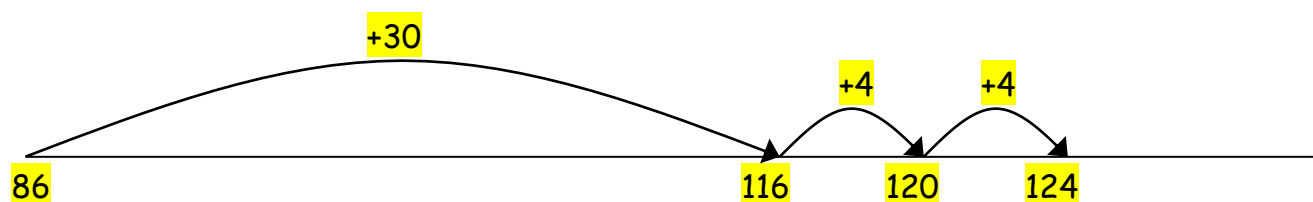
37 + 15 = 52

Stage 2 - Number line - Partitioning

Children will continue to use empty number lines with increasingly large numbers, including compensation where appropriate.
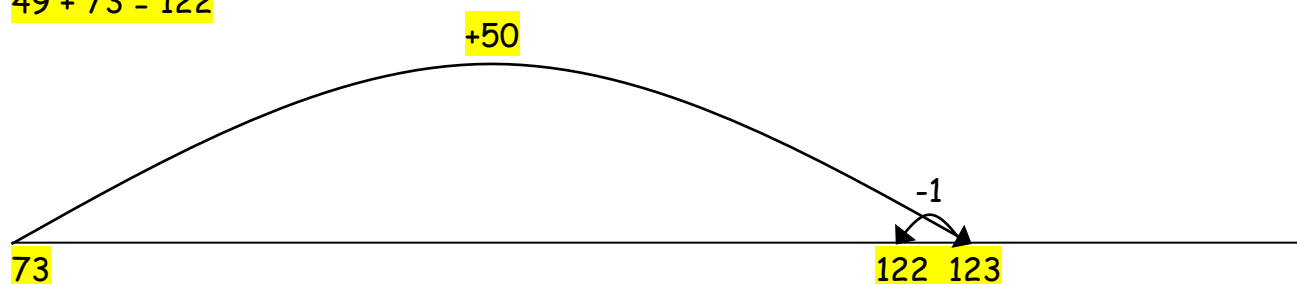
✓ Count on from the largest number irrespective of the order of the calculation.

38 + 86 = 124

✓ Compensation

49 + 73 = 122

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

Stage – 3 Partitioning

Partitioning

```
  67  = 60 + 7
+ 24    20 + 4
        80 + 11 = 91
```

Partitioning both numbers into tens and units mirrors the column method where units are placed under units and tens under tens. This also links to metal methods.

Expanded Column Addition

```
     67
  +  24
     1 1 ( 7 +  4)
     80 (60 + 20)
     91
```

Move onto a layout showing the addition of the units to the units then the tens to the tens separately. **To find the partial sums always add the units first.**

Stage – 4 Column method

Column Addition

```
  625          783          367
+  48        +   42        +  85
  673          825          452
   1            1           1 1
```

In this method recording is reduced further. Carry digits are recorded below the line, using the words 'carry ten' or ' carry one hundred' not 'carry one'.

Later, extend to adding three two-digit numbers, two three-digit numbers and numbers with different numbers of digits.

Column addition remains efficient when used with larger whole numbers and decimals. Once learned the method is quick and reliable.

Using similar methods, children will:
- ✓ *add several numbers with different numbers of digits;*
- ✓ *begin to add two or more three-digit sums of money, with or without adjustment from the pence to the pounds;*
- ✓ *know that the decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. £3.59 + 78p.*

Children should extend the carrying method to numbers with at least four digits and decimals up to two places.

```
  587          35.87
+ 475        +  6.75
 1062         42.62
  1 1         1 1 1
```

Using similar methods, children will:
- ✓ *add several numbers with different numbers of digits;*
- ✓ *begin to add two or more decimal fractions with up to three digits and the same number of decimal places;*

✓ *know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 3.2 m – 280 cm.*

Children should extend the carrying method to numbers with any number of digits and decimals including more than two tiers.

Children should extend the carrying method to numbers with any number of digits and decimals including more than two tiers.

```
    7648              6584              2042
+   1486          +   5848             5432
    9134             12432             2786
   1 11             1 11            + 1 944
                                      12204
                                      2 21
```

Using similar methods, children will
✓ *add several numbers with different numbers of digits;*
✓ *begin to add two or more decimal fractions with up to four digits and either one or two decimal places;*
✓ *know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 401.2 + 26.85 + 0.71.*

Children should not be made to go onto the next stage if:

1) **They are not ready.**
2) **They are not confident.**

Children should be encouraged to approximate their answers before calculating.
Children should be encouraged to check their answers after calculation using an appropriate strategy.
Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.