PROGRESSION THROUGH CALCULATIONS FOR ADDITION

MENTAL CALCULATIONS

These are a selection of mental calculation strategies. On an additional document you will find year group expectations for mental starters. Each week teachers must cover rapid recall, mental strategies and mental calculations.

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)

Add 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

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

THE FOLLOWING ARE <u>MINIMUM</u> STANDARDS THAT WE EXPECT THE CHILDREN TO ACHIEVE – SOME WILL ACHIEVE BEYOND THIS EXPECTATION AND THE CHILDREN MUST NOT BE LIMITED

'THERE IS NO LID ON LEARNING!'

YR and Y1

When using a hundred square, Whybridge will use a fly to add ones and a spider to add or take away tens.

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 and by writing number statements which include, =, + and - accurately
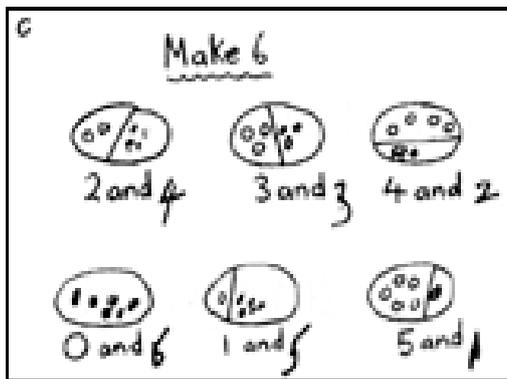
When using a number line Whybridge will use a frog to jump along the line.

They use number lines and practical resources to support calculation and teachers *demonstrate* the use of the numberline.
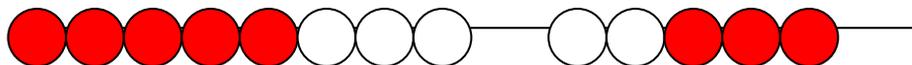
3 + 2 = 5
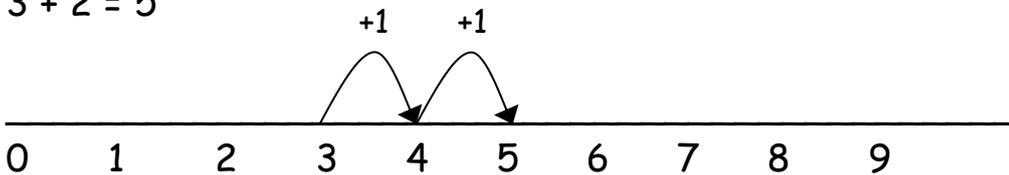
Children then begin to use numbered lines (which include 0) to support their own addition and subtraction calculations using a numbered line to count on in single digit and two digit numbers to 20.

8 + 5 = 13
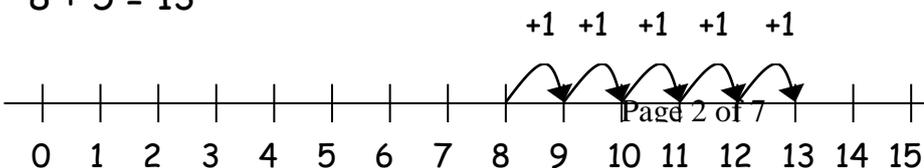
Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.
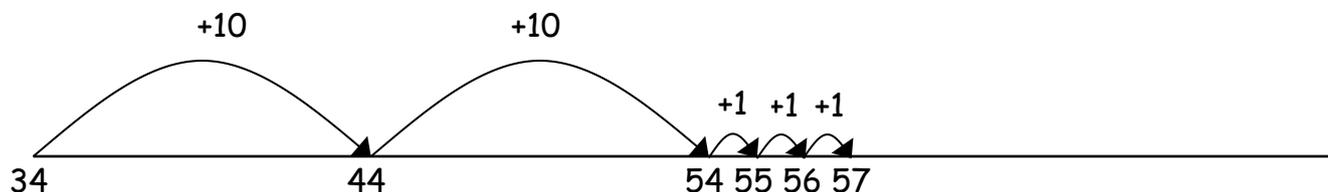

Children solve simple worded problems involving addition and subtraction. They are able to recall number bonds to 20.

Y2

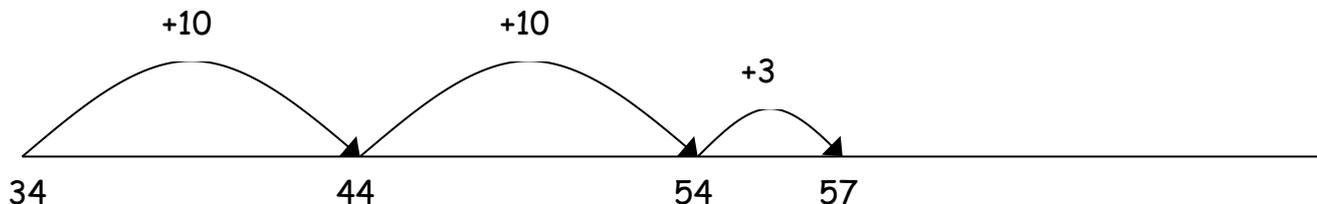Children will begin to use 'empty number lines' themselves starting with the larger number and counting on.

✓   First counting on in tens and ones.

34 + 23 = 57

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

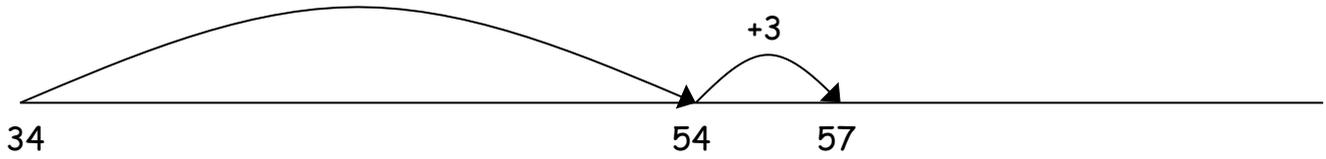34 + 23 = 57

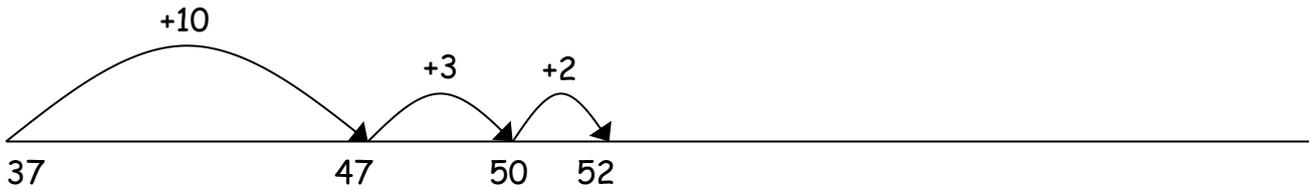✓   Followed by adding the tens in one jump and the ones in one jump.

34 + 23 = 57

+20

```
                                          +3
        _____       __
       /                         \     /  \
      /                           \   /    \
   34                              54       57
```

✓   Bridging through ten can help children become more efficient.

37 + 15 = 52

```
          +10
        _____            +3      +2
       /       \          __      __
      /         \        /  \    /  \
   37            47       50      52
                     50
```
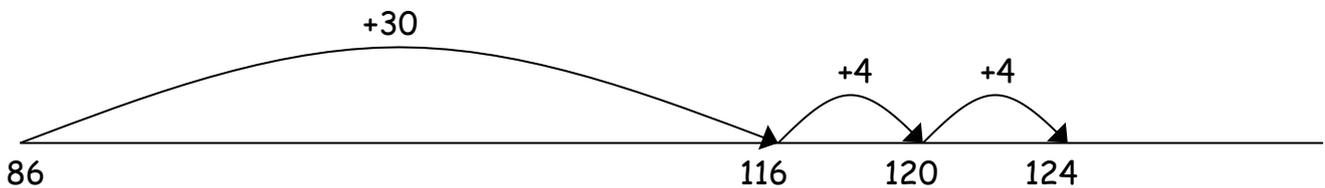
Children will continue to use empty number lines with increasingly large numbers, including compensation where appropriate.

✓   Count on from the largest number irrespective of the order of the calculation.

38 + 86 = 124

```
             +30
        _____        +4      +4
       /                 \      __      __
      /                   \    /  \    /  \
   86                      116    120     124
```

Children are able to recall and use + and – facts to 20 (building on previous work)

Children will begin to use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies. Addition and subtraction calculations, for up to two digit numbers, should not involve carrying and/or borrowing.

Children are introduced to 'find the difference' and 'take away' problems, including solving worded problems, and recognise that addition is commutative and that subtraction is not.

Children use <u>inverse</u> operations for addition and subtraction.

Children will use place value cards to partition numbers and add one or ten more.

Children will use the expanded column addition method to add

Children will be able to add and subtract numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers

Children should begin to record addition sums using the expanded addition method to support place value. Between each column children must leave two squares.

300   50   7

<u>400   20   6</u>

700   70   13 = 783

Y3

Children use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies. They are able to accurately add and subtract mentally pairs of:

- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds

And solve word problems – including problems involving missing numbers.

Children use column addition and subtraction for numbers with up to three digits. Adding or subtracting the least significant digits first

Moving digits across columns will be above the line. Children will be taught from the infants to leave a line between the sum and the answer box.

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

Y4

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.

Moving digits across columns will be above the line. Children will be taught from the infants to leave a line between the sum and the answer box.

```
     587            3587
  +  475         +   675
      1 1            1 1 1
   _____        _____
     1062           4262
```

And use estimation and the inverse to check answers for accuracy.

Y5

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.*

Y6

Children should extend the carrying method to number with any number of digits.

Moving digits across columns will be above the line. Children will be taught from the infants to leave a line between the sum and the answer box.

```
    7648              6584                  42
 +  1486           +  5848               6432
   1 1 1             1 1 1                 786
 ─────────         ─────────                 3
    9134             12432             +  4681
                                         1 2 1
                                      ─────────
                                         11944
```

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.*

+ - + - + - + - + - + - +

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

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.