# Calculation Policy for Parents

Key Stage 2

Introduction

At West Acton, we believe children should have the opportunity to develop and consolidate their calculation skills using a range of resources and real-life activities to support their understanding. Mathematical understanding is developed through use of representations that are first of all concrete (e.g. Numicon, Base 10, bead strings), and then pictorial (e.g. number lines and arrays) to help children understand abstract working (e.g. Column addition, long multiplication).Children are encouraged to understand the ideas that underpin the calculation alongside knowing number facts and are given opportunities to apply their calculating skills throughout the curriculum to develop their fluency and understanding.
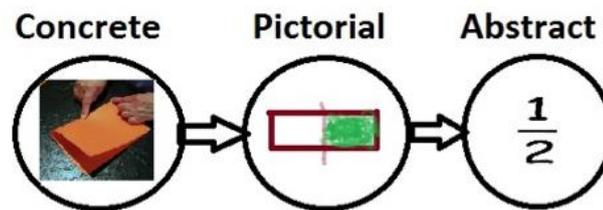
Ideas to support your children at home

- Help your children to learn their times tables. Children are expected to know their times tables up to 12 x 12 by the end of Year 4.
- Practise number bonds to 20, 50 and 100 by playing Ping Pong- give your child a number such as 35. Ask them to quickly reply with the number that makes 50 or 100.
- Give children opportunities to handle money in shops and check their change is correct.
- Ask them to work out how long various activities and journeys take.
- Play games involving numbers/logic such as dominoes, darts, chess and card games.
- 'The answer is 10 (or any number.) What is the question? '
- Involve children in cooking. Ask them to double or halve the recipe.

Useful websites

http://www.bbc.co.uk/bitesize/ks2/maths/number/

http://www.crickweb.co.uk/ks2numeracy.html

http://www.mathletics.co.uk/

http://www.topmarks.co.uk/maths-games/7-11-years/multiplication-and-division
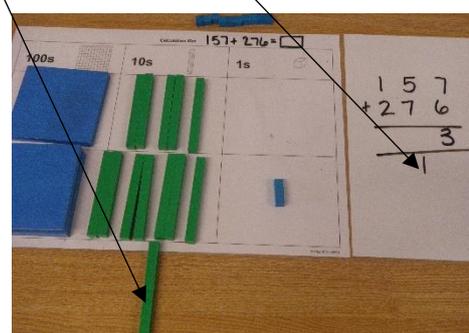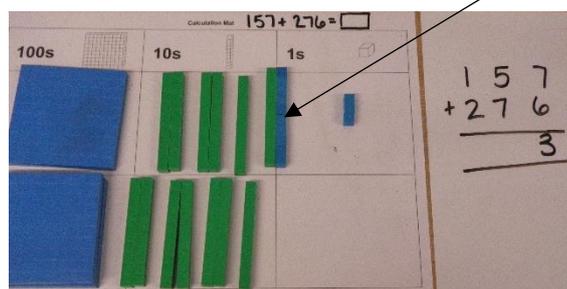
Addition

Stage 3

Children use Base 10 to support their calculations. They will combine the two amounts they are adding, represent this using pictures and then use a calculation. They can also use a number line, partitioning the smaller number. Number lines are encouraged as a mental strategy.
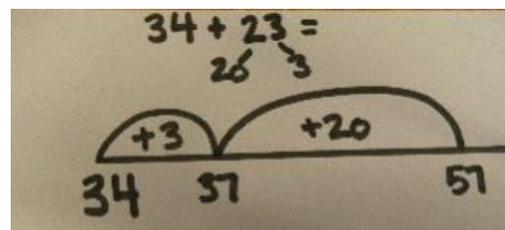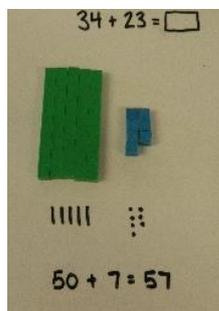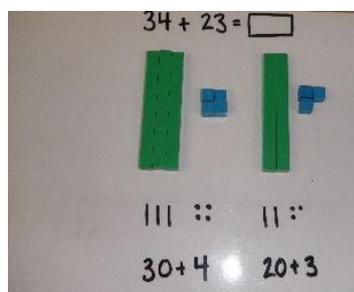
Stage 4

Children to continue to use Base 10 for sums that require exchanging. They may use place value mats to reinforce their understanding of place value. 10 cubes are physically exchanged for 1 rod. Children record their working out alongside the practical representation. The rod (10) is carried below as in the calculation.

Stages 5 & 6

When children have an understanding of the methods behind addition they move on to recording it symbolically, missing out the pictorial and practical stages. They solve problems with larger numbers and decimals, always beginning with the smallest place value and working through to the largest.

- Add units and exchanging when necessary
- Add tens and exchange
- Add hundreds and exchange

The formal written method from the national curriculum that children should achieve by the end of Key Stage 2.
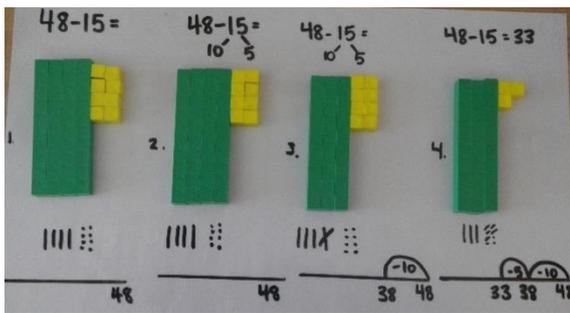
789 + 642 becomes

$$
\begin{array}{ccc}
 & 7 & 8 & 9 \\
+ & 6 & 4 & 2 \\
\hline
1 & 4 & 3 & 1 \\
 & & 1 & 1 \\
\end{array}
$$

Answer: 1431

Subtraction

Stage 3

Children use Base 10 to support their calculations as necessary. They will make the larger number and take away the smaller amount, recording using images of the Base 10 or a number line.

Stage 4

This stage involves exchange (decomposition). Children show the calculation using the Base 10 equipment, represent it pictorially before moving on to symbolic representation using the compact method.

- They realise there are not enough ones/units to take away the nine, so they exchange one ten for ten ones. (there are now 17 units/ones) and 2 tens
- The units/ones are subtracted first $17 - 9 = 8$
- The tens are subtracted next $20 - 10 = 10$
- How many are left?
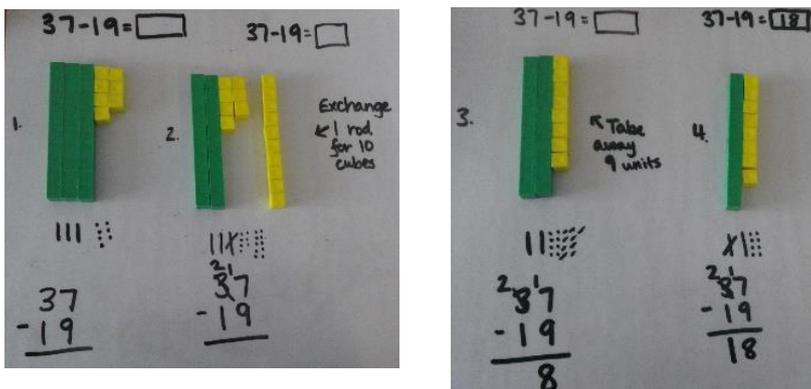
Stage 5

When children are confident solving subtraction calculations involving Base 10, they are encouraged to use the formal written method only and to check calculations using addition as the inverse. Children can return to models and images when necessary to solve a problem. As children progress, they will solve problems with larger numbers, different place values and decimals.

The formal written method from the national curriculum that children should achieve by the end of Key Stage 2.

874 – 523 becomes

```
    8  7  4
 -  5  2  3
 ─────────
    3  5  1
```

Answer: 351

932 – 457 becomes

```
    8  12  1
    9   3  2
 -  4   5  7
 ──────────
    4   7  5
```
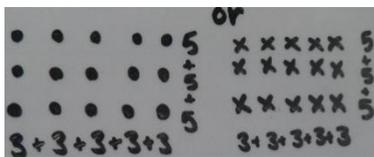
Answer: 475

Multiplication

Stage 3

Children use a range of resources like Cuisenaire, bead string, Numicon and multi-link cubes to represent multiplication. They link this to repeated addition on a number line and understand multiplication in using vocabulary such as 3 lots of 5= 15.
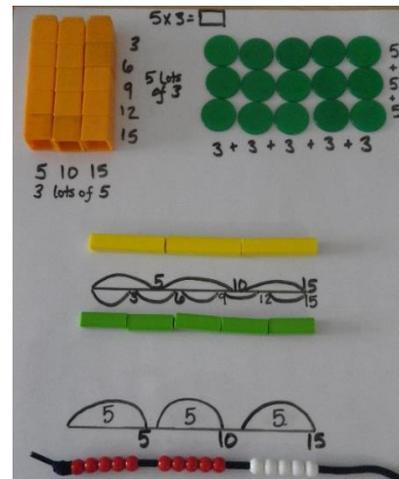
Children also begin to make arrays using symbols as seen below.

By the end of Year 4 children are expected to know their times tables up to 12 x 12.

Stage 4

Children will continue to use arrays to lead into the grid method of multiplication using base 10 or Cuisenaire to represent the multiplication as array and the link to the grid method. Recording in a grid whilst making the array with the practical apparatus will help children understand the concept. They make representations based on the Cuisenaire. This reinforces children's understanding before moving on.
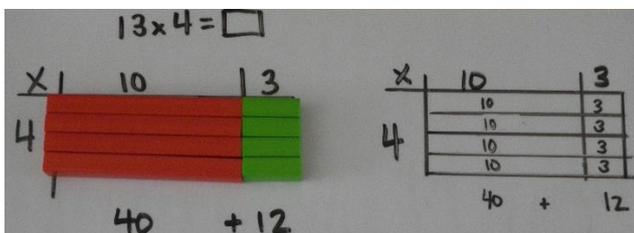
Stage 5

When the children are familiar with showing what the multiplication calculation looks like they can remove the practical apparatus and use the grid as seen below. This is linked to the expanded column method.
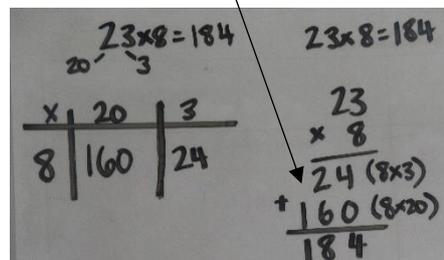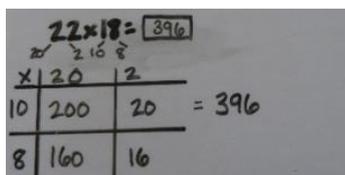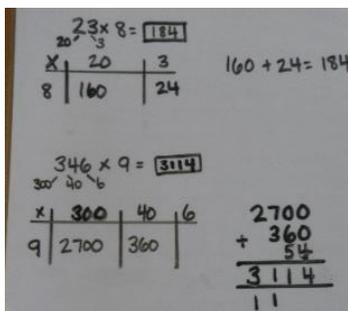
Stage 6

When children understand the place value behind using the grid method they move on to formal written methods.

24 × 6 becomes
```
    2 4
×     6
  1 4 4
    2
```
Answer: 144

342 × 7 becomes
```
    3 4 2
×       7
  2 3 9 4
    2 1
```
Answer: 2394

2741 × 6 becomes
```
    2 7 4 1
×         6
  1 6 4 4 6
    4 2
```
Answer: 16 446

124 × 26 becomes
```
      1 2
      1 2 4
×       2 6
      7 4 4
    2 4 8 0
    3 2 2 4
    1 1
```
Answer: 3224

Division

Stages 3 & 4

Children continue to use practical equipment to represent division calculations as grouping and use jottings to support their calculation.

24 ÷ 4 = ? Children begin to read this calculation as 'How many groups of 4 are there in 24?' or 'What is 24 divided into groups of 4?'

They show what this would look like using a range of practical resources and through pictorial representations including the number line.

At this stage, children will also be introduced to division calculations that result in remainders. They show this using practical resources such as a beadstring and recording on a number line.

25 ÷ 4 = ?
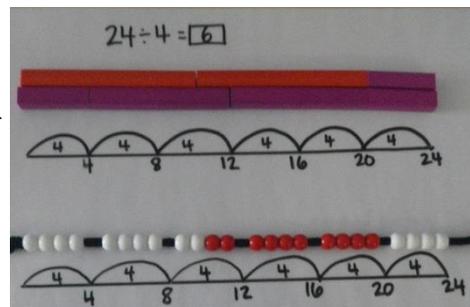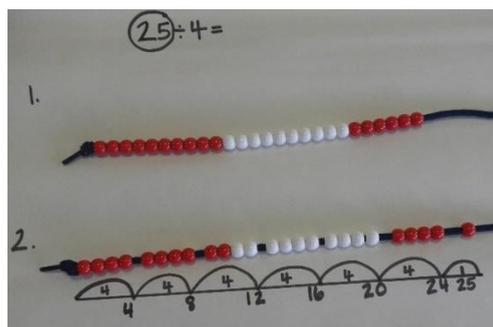
Children progress to numbers that are outside their table knowledge (e.g. 42 ÷ 3) where they begin using 'chunking.' They show this on bead strings and consider how they can take a 'bigger chunk' but know how many groups of 3 are in that chunk. (10)

Stage 5

Children are expected to know short division by the end of year 5. While it doesn't link directly to chunking, they can use practical resources e.g. base 10 and bead strings to help them work out how many groups are in a number.

Short division

98 ÷ 7 becomes

Answer: 14

432 ÷ 5 becomes

Answer: 86 remainder 2

496 ÷ 11 becomes

Answer: $45\frac{1}{11}$

Stage 6

When dividing with remainders children need to be able to recognise what the remainder will be as a number, as a fraction and as a decimal.

432 ÷ 15 becomes

$\frac{12}{15} = \frac{4}{5}$

Answer: $28\frac{4}{5}$