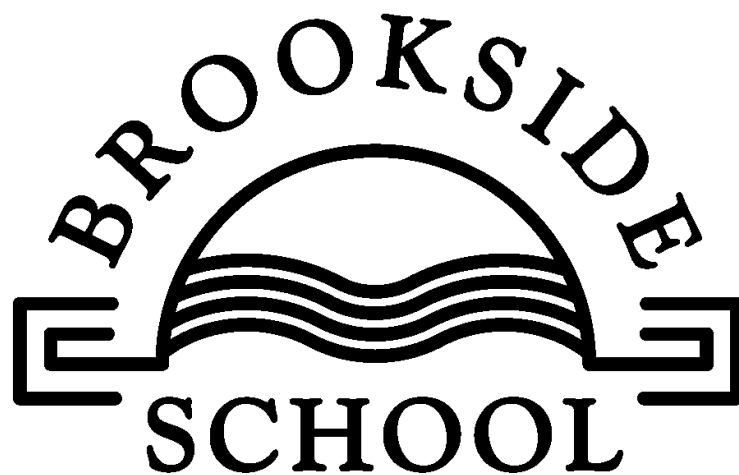


Progression in Numeracy



The four rules

Contents

1. Introduction
2. Addition
3. Subtraction
4. Multiplication
5. Division

Introduction

After talking to many parents, it has become apparent that it would be helpful if you had some knowledge of the strategies used to teach number and of the progression of methods throughout school.

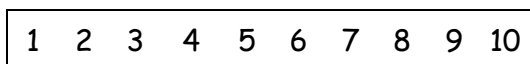
Obviously there are some differences (and similarities) in the way you may recall being taught at school, or indeed, in the way in which you may calculate an answer.

Hopefully, this booklet will illustrate some of the methods used at Brookside school and help you to support your child's education.

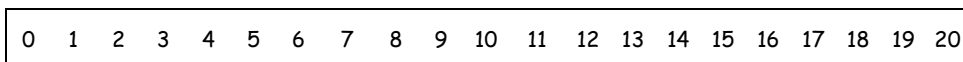
Please get in touch with your child's class teacher if you are still not sure about any of these methods.

Addition

Stage 1 Counting and combining real objects up to 10
Introduce numbers and the + sign
Counting forwards and backwards
Number lines used initially to 10



Stage 2 Using apparatus to count and combine bigger numbers
Counting backwards and forwards up to 20
Recognition that $13 + 6 = 6 + 13$
Learn to count on from the largest number



Stage 3 Introduce numbers up to 100
Counting backwards and forwards to 100
Missing numbers in different places

$$14 + \square = 20 \quad \square + 14 = 20 \quad 20 = \square + 14$$

Using 100 squares to add multiples of 10
e.g. $24 + 10$ $24 + 20$

Adding tens and units horizontally

$$\begin{array}{l} 37 + 21 \quad \longrightarrow \quad 30 + 20 = 50 \\ \quad \quad \quad \quad \quad \quad \quad \quad \quad 7 + 1 = 8 \\ \quad \quad \quad \quad \quad \quad \quad \quad \quad 50 + 8 = 58 \end{array}$$

Both these methods
will be taught.

And / Or

$$\begin{array}{l} 37 + 21 \quad \longrightarrow \quad 37 + 20 = 57 \\ \quad \quad \quad \quad \quad \quad \quad \quad \quad 57 + 1 = 58 \end{array}$$

This method links to
using a 100 square.

Stage 4 Working with hundreds, tens and units
Partitioning and recombining numbers

$$\begin{aligned}129 + 134 &\longrightarrow 9 + 4 = 13 \\ &20 + 30 = 50 \\ &100 + 100 = 200 \\ &200 + 50 + 13 = 263\end{aligned}$$

Stage 5 Working with hundreds, tens and units
Vertical methods introduced

$$247 + 126$$

$$\begin{array}{r}247 \\ + 126 \\ \hline\end{array} \quad \begin{array}{l}200 + 40 + 7 \\ \underline{100 + 20 + 6} \\ 300 + 60 + 13 = 373\end{array}$$

Stage 6 Using carrying method

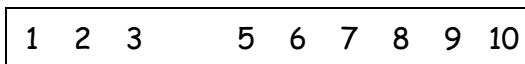
$$\begin{array}{r}625 \\ + 48 \\ \hline673 \\ 1\end{array}$$

Stage 7 Extend to bigger numbers and decimals
When using decimals reinforce work on place value

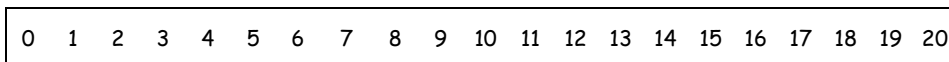
Addition is the inverse of subtraction.

Subtraction

- Stage 1 Practical activities using real objects up to 10
Reinforce numbers and introduce the - sign
Counting backwards
Placing numbers on a number line initially to 10



- Stage 2 Using apparatus to subtract bigger numbers
Counting backwards from 20 orally and on a number line
Recognition that subtraction is not reversible
(The largest number has to go at the start)



- Stage 3 Continue with numbers up to 100
Counting backwards from numbers up to 100
Missing numbers in different places

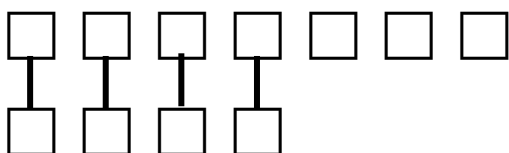
$$20 - \square = 6 \quad \square - 14 = 6 \quad 14 = \square - 6$$

Practise taking away multiples of 10 using 100 square

Simple horizontal subtraction

$$27 - 14 \rightarrow \begin{array}{l} 27 - 4 = 23 \\ 23 - 10 = 13 \end{array} \quad \text{or} \quad \begin{array}{l} 27 - 10 = 17 \\ 17 - 4 = 13 \end{array}$$

Finding the difference practically, e.g. 7 - 4



Stage 4 Vertical methods are introduced

$$\begin{array}{r}
 547 \\
 -123 \\
 \hline
 \end{array}
 \qquad
 \begin{array}{r}
 500 + 40 + 7 \\
 - 100 + 20 + 3 \\
 \hline
 400 + 20 + 4 \\
 = 424
 \end{array}$$

Stage 5 This leads on to the next stage which also includes decomposition

$$\begin{array}{r}
 257 \\
 - 23 \\
 \hline
 234
 \end{array}
 \qquad
 \begin{array}{r}
 \begin{array}{c} 4 \\ \diagdown \\ 3 \end{array} 5 7 \\
 - 1 2 8 \\
 \hline
 2 2 9
 \end{array}$$

Finding the Difference

Subtraction calculations can be solved by finding the difference. When working out the difference between two numbers, it is often easier for children to count on using blank number lines.

53 - 47

A number line starting at 47 and ending at 53. There are six upward-pointing arcs above the line, each labeled '+1'. The numbers 47, 50, and 53 are marked below the line. To the right of the number line, it says 'A = 6'.

55 - 34

A number line starting at 34 and ending at 55. There are three upward-pointing arcs above the line. The first two are labeled '+10' and the third is labeled '+1'. The numbers 34, 44, 54, and 55 are marked below the line. To the right of the number line, it says 'A = 21'.

2003 - 998

A number line starting at 998 and ending at 2003. There are three upward-pointing arcs above the line. The first is labeled '+2', the second is labeled '+1000', and the third is labeled '+3'. The numbers 998, 1000, 2000, and 2003 are marked below the line. To the right of the number line, it says 'A = 1005'.

Subtraction is the inverse of addition.

Multiplication

Stage 1 Practical activities using groups of objects
Counting in twos from 0 to 10



Stage 2 Oral counting in twos and tens
Introduce \times sign meaning lots of
Link repeated addition to multiplication

$$2 + 2 + 2 + 2 = 4 \times 2$$

Stage 3 Counting in fives and threes
Doubles are linked to multiplying by 2
Understand that 2 lots of 4 is the same as 4 lots of 2



$$4 \times 2 = 8$$

$$2 \times 4 = 8$$

Stage 4 Horizontal partitioning methods

$$15 \times 3 \quad \longrightarrow \quad \begin{array}{l} 5 \times 3 = 15 \\ 10 \times 3 = 30 \\ 30 + 15 = 45 \end{array}$$

Division

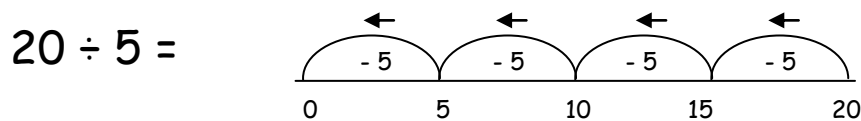
Stage 1 Practical activities sharing objects equally
Practical activities grouping objects together



Stage 2 Halving activities
Introduce \div sign meaning divide by and share between
Make the link between division and multiplication

$$8 \div 4 = 2 \text{ and } 2 \times 4 = 8$$

Stage 3 Use horizontal methods linked to multiplication tables
Understand division as repeated subtraction



Stage 4 Word and visual problems with remainders

Share 14 marbles between 5 children.
How many marbles does each child get?
How many will be left over?
Pictorial representations
often used

$$14 \div 5 = 2 \text{ r } 4$$

$$\begin{array}{r}
 1 \quad 6 \\
 \hline
 6 \overline{) 9 \quad 6} \\
 \underline{- 6 \quad 0} \quad 10 \text{ lots} \\
 3 \quad 6 \\
 \underline{- 3 \quad 6} \quad 6 \text{ lots} \\
 0
 \end{array}$$

Stage 5 Division of tens
and units by a unit
Repeated subtraction

Updated April 2010