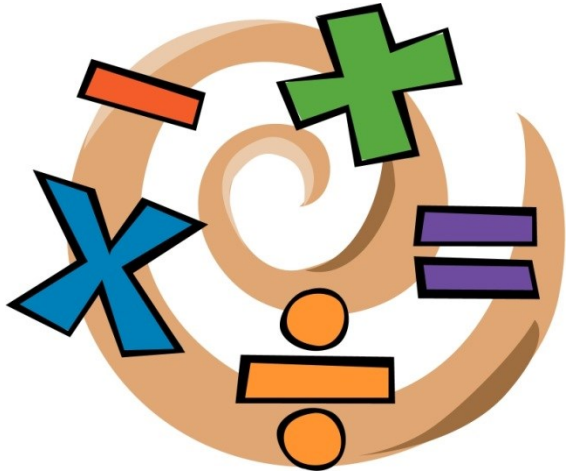


A guide to



calculation methods used in school

St John's and St Clement's CE Primary

Parent Workshops

Want to learn more about how calculation is taught and how you can help your child? Suitable for parents with children in any year group.



Addition and Subtraction workshops

Monday 11th March 2013 9am and 6pm

Multiplication workshops

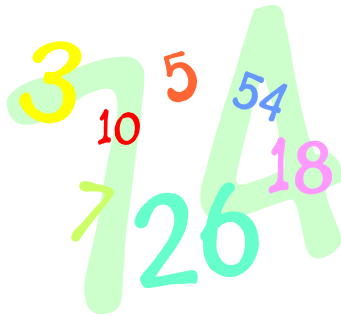
Wednesday 22nd May 2013 9am and 6pm

Division workshops

Thursday 4th July 2013 9am and 6pm

Calculation Booklet

Teaching methods in maths have changed over the years. The information in this booklet is to inform you of the various methods that we teach so you can help you to help your child at home.



Much time is spent on teaching mental calculation strategies.

Up to the age of about 8 or 9 (Year 4), informal written recording should take place regularly as it is an important part of learning and understanding.

Formal written methods, which you will be more familiar with, should follow only when your child is able to use a wide range of mental calculation strategies.

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Use of mental strategies

Children are taught a range of mental strategies. At Key Stage 1, a lot of time is spent teaching number bonds to 10, 100 and 20, so that children know that $7 + 3$ make 10, $70 + 30$ make 100 and $17 + 3$ make 20.

Strategies for teaching mental addition include:

Putting the largest number first:

$5 + 36$ is the same as $36 + 5$. Start at 36 and count on in ones

$30 + 60$ is the same as $60 + 30$. Start at 60 and count on in tens

Partitioning:

$$14 + 25 = (10 + 4) + (20 + 5)$$

$$(10 + 20) = 30$$

$$(4 + 5) = 9$$

The answer is 39

Compensation:

$$17 + 9 = 17 + 10 - 1 = 26$$

$$26 + 11 = 26 + 10 + 1 = 37$$

Doubles or near doubles:

$$8 + 8 = 16$$

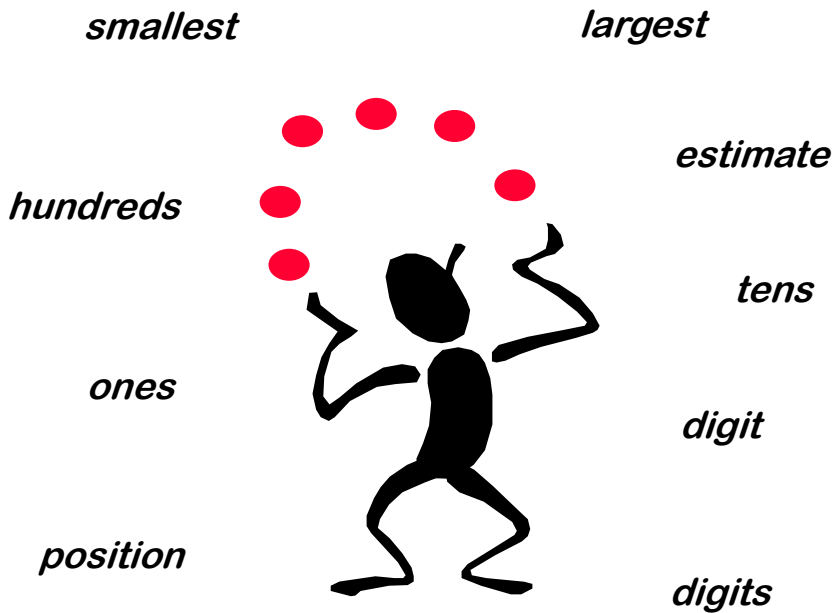
$$\text{so } 8 + 9 = 8 + 8 + 1 = 17$$

Bridging through 10, 20 etc

$$8 + 7 = (8 + 2) + 5$$

$$10 + 5 = 15$$

$$15 + 9 = (15 + 5) + 4$$



Written strategies

Up to Year 3, the emphasis is on children working mentally - calculations recorded in horizontal number sentences with some jottings for more challenging numbers.

In Years 3-6 children, will be taught more formal written methods of calculation.

Stages in Addition

Early Stages

Children will engage in a wide variety of songs and rhymes, games and activities.

They will begin to relate addition to combining two groups of objects, first by **counting all** and then by **counting on** from the largest number.

In practical activities and through discussion they will begin to use the vocabulary involved in addition.

How many apples altogether?



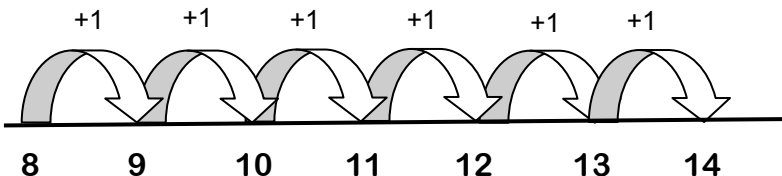
Counting on using a numberline

Initially use a number track to count on.

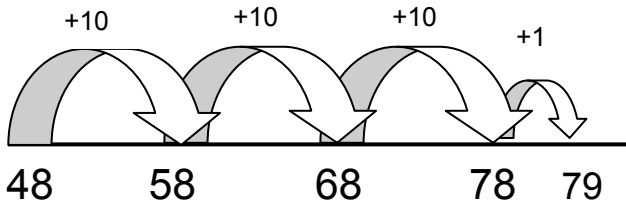


Then progress to a marked number line.

$$8 + 6 = 14 \quad \text{put the biggest number first and count on}$$



48 + 31 = 79 put the biggest number first, then partition other number and count on eg 48 + 30 + 3



Partitioning method for addition

$$\begin{array}{c} 43 \\ / \quad \backslash \\ 40 \quad 3 \end{array} + \begin{array}{c} 25 \\ / \quad \backslash \\ 20 \quad 5 \end{array} = 68$$

$$40 + 20 = 60$$

$$3 + 5 = 8$$

$$60 + 8 = 68$$

Moving on to...

$$48 + 36 = 40 + 8 + 30 + 6$$

$$40 + 30 = 70$$

$$8 + 6 = 14$$

$$70 + 14 = 84$$

$$48 + 36 = 84$$

Expanded Written Method

$$76 + 47 = 123$$

$$\begin{array}{r} 76 \\ + 47 \\ \hline 13 \quad (7 + 6) \\ + 110 \quad (70 + 40) \\ \hline 123 \end{array}$$

start by adding the least significant digits
i.e. the units/ ones
then add the tens

Standard Written Method

$$76 + 47 = 123$$

$$\begin{array}{r} 47 \\ + 76 \\ \hline 123 \\ \hline 1 \end{array}$$

Stages in Subtraction

Early Stages

Children will engage in a variety of counting songs and rhymes and practical activities.

In practical activities and through discussion they will begin to use the vocabulary associated with subtraction

They will begin to relate subtraction to 'taking away'.

Count how many are left after some have been taken away

Use objects to count how many are left after some have been taken away.

$$9 - 5 = 4$$



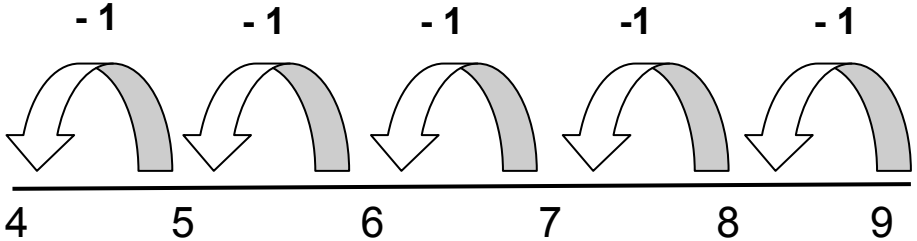
Using a number line to count back

Initially use a number track to count back.



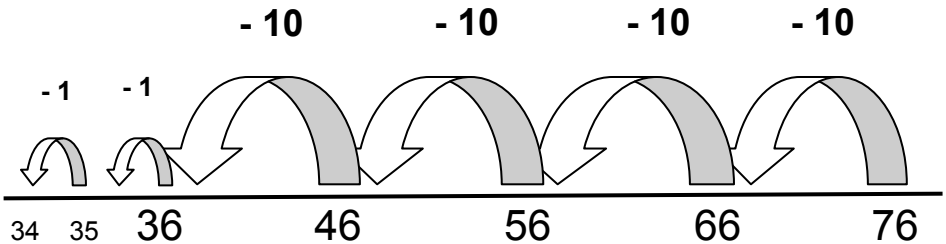
Then progress to a marked number line.

$$9 - 5 = 4$$



Subtraction using partitioning on an empty number line

$$76 - 42 = 34$$



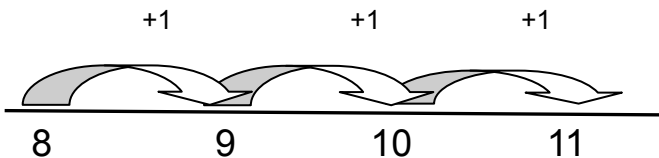
Counting on to find a small difference

Children need to be introduced to complementary addition to find small differences. The use of models is extremely important here to understand the idea of “difference”.

Count up from the smallest number to the largest to find the difference

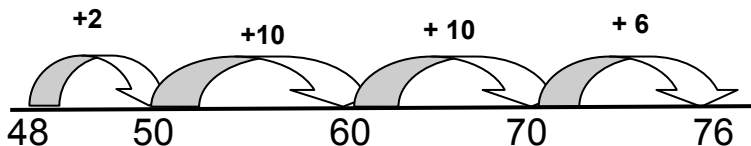
‘What is the difference between 8 and 11?’

$$11 - 8 = 3$$

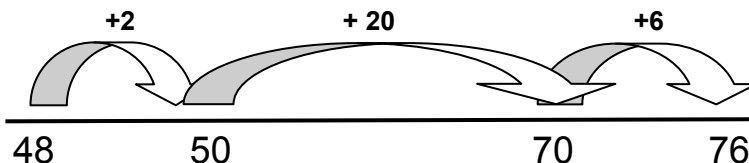


Counting on using fewer jumps

$$76 - 48 = 28$$



$$76 - 48 = 28$$



Compensation method

$$84 - 19 = 65$$

subtract 20 and compensate by adding one back



Expanded written method

$$78 - 23 = 55$$

partition numbers into tens and ones
then subtract and recombine

$$\begin{array}{r} 70 + 8 \\ -20 + 3 \\ \hline 50 + 5 = 55 \end{array}$$

NB this method is only appropriate where decomposition (exchange) is not required

Expanded method leading to standard method, involving decomposition/exchange

$$74 - 27 = 47$$

$$\begin{array}{r} 70 + 4 \\ -20 + 7 \\ \hline \end{array} \quad \begin{array}{r} \overset{60}{70} + \overset{14}{4} \\ -20 + 7 \\ \hline 40 + 7 \end{array} \quad \begin{array}{r} \overset{6}{7} \overset{14}{4} \\ -27 \\ \hline 47 \end{array}$$

Stages in Multiplication

Early stages

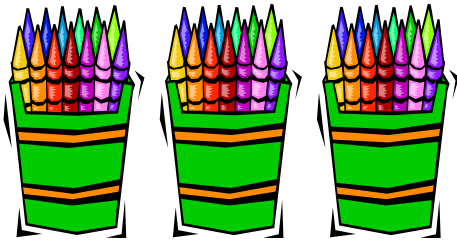
Children will count repeated groups of the same size in practical contexts.

They will use the vocabulary associated with multiplication in practical context.

They will solve **practical problems** that involve combining groups of 2, 5 or 10.

e.g. socks, fingers and cubes.

Combining Groups (Repeated addition)

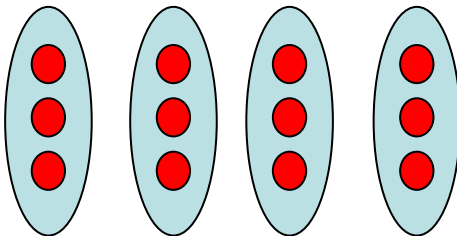


3 groups of 10 crayons

How many crayons altogether?

$$10 + 10 + 10 = 30$$

$$3 \times 10 = 30$$



$$3 + 3 + 3 + 3 = 12$$

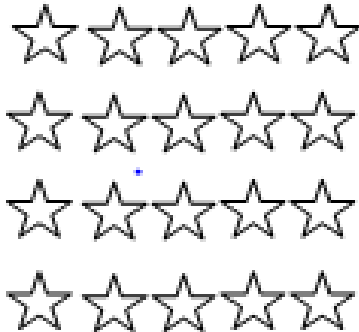
Four lots of three is twelve

Four groups of three equals twelve

$$4 \times 3 = 12$$

Using an Array

$$4 \times 5 = 20$$



$$5 + 5 + 5 + 5 = 20$$

4 rows of 5

4 groups of 5

5 groups of 4

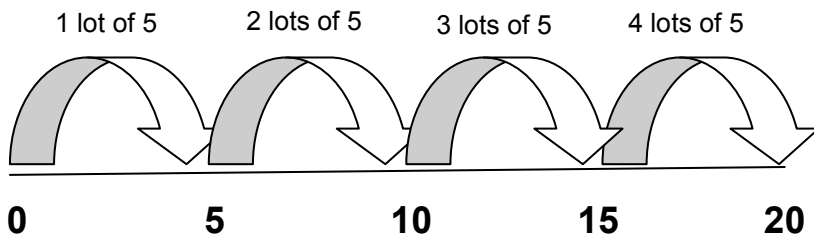
$$5 \times 4 = 20$$

$$4 \times 5 = 20$$

Using a numberline

$$4 \times 5 = 20$$

$$4 \text{ lots of } 5 = 20$$



Link to repeated addition

$$5 + 5 + 5 + 5 = 20$$

Partitioning

$$13 \times 5 = 65$$

$$10 \times 5 = 50$$

$$3 \times 5 = 15$$

$$50 + 15 = 65$$

Link to number line

Grid Method

$$13 \times 7 = 91$$

X	10	3
7	70	21

= 91

Partition 13 into 10 + 3 then multiply each number by 7

Expanded short multiplication

$$38 \times 7 = 266$$

$$\begin{array}{r} 30 + 8 \\ \times \quad 7 \\ \hline 210 \\ \quad 56 \\ \hline 266 \end{array}$$

($30 \times 7 = 210$) make the link to the grid method
($8 \times 7 = 56$)

$$\begin{array}{r} 38 \\ \times 7 \\ \hline 210 \\ \quad 56 \\ \hline 266 \end{array}$$

refine the recording

Compact short multiplication

$$38 \times 7 = 266$$

$$\begin{array}{r} 38 \\ \times 7 \\ \hline 266 \\ 5 \end{array}$$

the carried digit is recorded below the line

NB the grid method is the main method used by many children. Some children will be taught long multiplication if appropriate.

Stages in Division

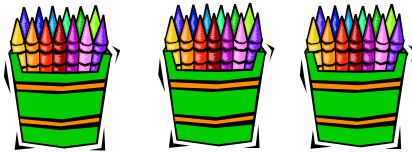
Early stages

Children will start with practical sharing using a variety of equipment.

They will share objects into equal groups in practical contexts. They will begin to use the vocabulary associated with division in practical context.

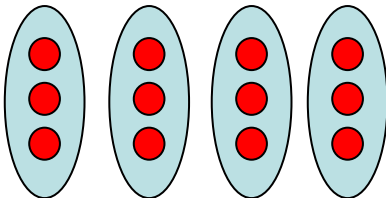
Children will move from **sharing** to **grouping** in a practical way.

Sharing



Share 30 crayons between 3 pots.

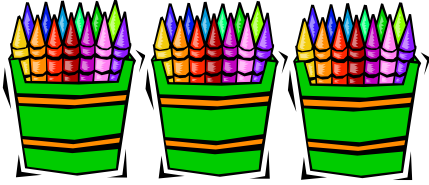
How many in each pot?



12 shared between four people is 3

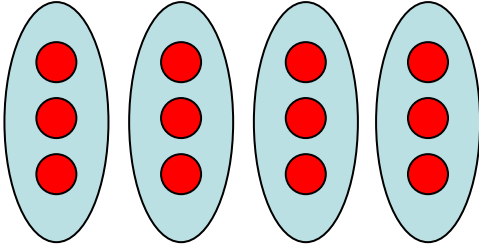
$$12 \div 4 = 3$$

Grouping



Put 30 crayons into groups of 10.

How many pots do we need?



Twelve divided into groups of four = three groups

How many fours in twelve?

$$12 \div 4 = 3$$

Arrays

$$24 \div 3 = 8$$



How many groups of 3 in 24?

How many groups of 8 in 24?

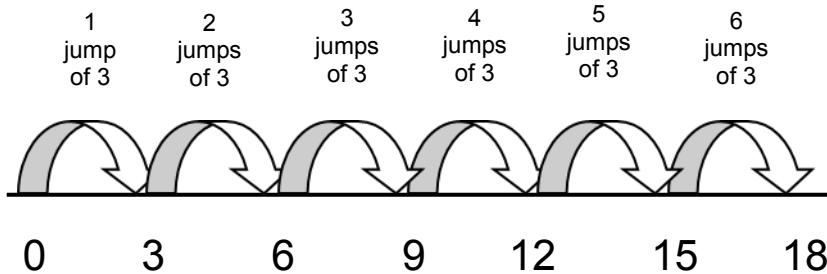
24 shared between 3 people is...?

$$24 \text{ divided by } 3 = 8$$

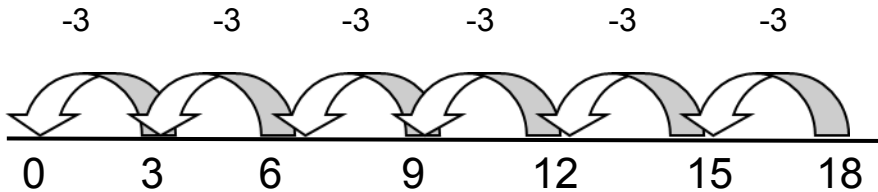
They will solve **practical problems** that involve combining groups of 2, 5 or 10.
e.g. socks, fingers and cubes

Using a number line

$$18 \div 3 = 8$$



Also jump back from 24 to make the link with repeated subtraction



Then use a number line to show division with remainders

Mental division using partitioning (two digits divided by one digit)

$$84 \div 7 = 12$$

$$= 70 + 14 \quad \text{partition 84 into 70 and 14}$$

$$70 \div 7 = 10$$

$$14 \div 7 = 2$$

$$10 + 2 = 12$$

Chunking (no remainders)

informal method subtracting multiples of the divisor or 'chunking'
(link to repeated subtraction)

$$65 \div 5 = 13$$

$$\begin{array}{r} 65 \\ - 50 \\ \hline 15 \\ - 15 \\ \hline 0 \end{array} \quad \begin{array}{l} (10 \times 5) \text{ we have subtracted } 10 \text{ 'chunks' of } 5 \\ (3 \times 5) \text{ we have subtracted } 3 \text{ 'chunks' of } 5 \end{array}$$

Answer: $10 + 3 = 13$

Short method of division (compact method)

will be taught when appropriate and when the teacher feels the child is ready.

Number fun!

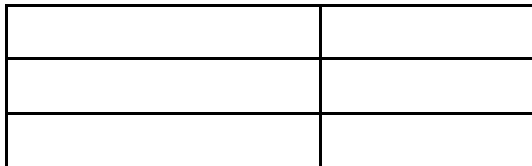
Try the questions below. Work with a partner, talk about the question, make jottings and record your answer.

- * Make the biggest number you can, using each of these digits only once.

4 3 6 8

- * Write the number in figures and write it in words.

- * How many rectangles can you count?



- * The total of the bill below is correct, but there are two mistakes in the entries. Find them and correct them.

Bobby's Bakers

2 loaves	£1.60
6 cakes at 30p each	£1.08
4 packets of crisps	£6.40
Swiss roll	£0.75
	<hr/>
	£4.79

Number games

- Skipping – every skip count 2, 3, 4 etc.
- Hop scotch
- Ludo
- Snakes and ladders
- Dominoes
- Cards – number sequences
- Cards – Rummy, Patience, Pontoon, Snap
- Bingo
- Yahtzee
- Darts
- Heads & Tails and keep a tally
- Chess and draughts
- Monopoly
- Computer programmes
- Beetle
- Connect 4
- Counting games to practise times tables
- I spy a number in town, on a journey
- Number jigsaws
- Clock golf, croquet, crazy golf on holiday to help counting
- Snooker and pool
- Number Lotto
- Dot to dot with numbers
- Skittles
- Happy families
- Whist
- Cribbage
- Number crosswords, dot to dot, puzzles



The level of mathematical challenge in a board game can be altered by introducing more dice & either adding or subtracting the numbers thrown.

