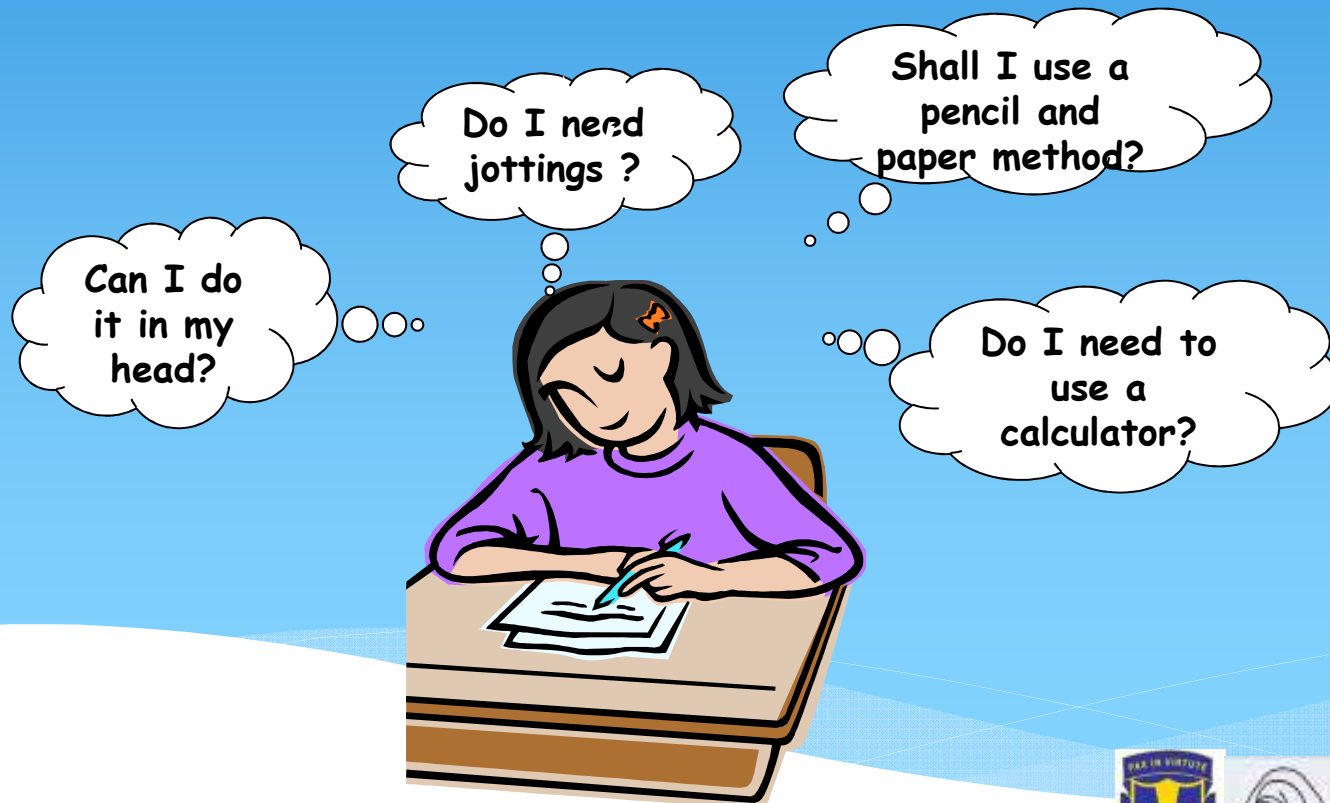


Catholic Partnership Progression through Calculations



DfEE 1999 (15 years ago!)

‘Parents who are confident about maths tend to have children who are also confident, and these children are ready to tackle and assimilate new ideas in a way that is impossible for children who feel uncertain about, or even fear, maths.’



November 2012

The new primary curriculum recommends introducing calculators at the end of primary school (year 6) and only when pupils are secure in **written** and mental arithmetic.



The New Primary Curriculum 2014



- * Standard written calculations by the end of Year 4



Aims

- * **To look at the ways in which the teaching of mathematics has changed;**
- * **To look at how children calculate;**
- * **Try activities to develop calculation strategies;**
- * **To look at ways in which parents can help their children**



Mental calculations

Children are encouraged to count in different ways and to calculate mentally.

Number lines – Bead bar / number stick / individual number lines / Number ladders/Numicon



Calculations

The aim is that children will always be able to recognise when calculations can be done 'in their heads' and choose effective and efficient strategies to work out the answers.



Overview

Up to Year 3 the emphasis **has been** on:

- working mentally,
- calculations recorded in horizontal number sentences
- some jottings for more challenging numbers
- Models and Images

The new Primary Curriculum states that by the end of Year 4 all pupils will be using standard written calculations.



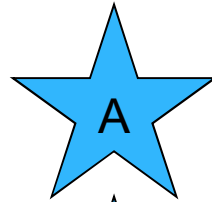
So - how can we give children the best foundations for success with written calculations?

- We need to encourage children to use mental calculation strategies for smaller/ simpler numbers.
- We need to encourage children to ask the question “Can I do it in my head?” or “Can I do it in my head with jottings/ a number line?”
- Can I confidently show my written methods for calculation?

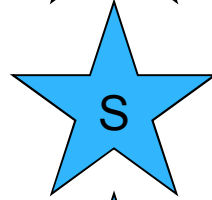


4 Calculation areas

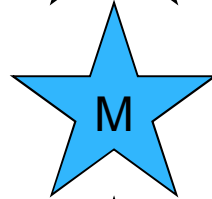
* Addition



* Subtraction



* Multiplication



* Division



Addition- Progression







- Mental calculation supported by:
 - Jottings
 - Number lines
- Expanded method using partitioning
- Compact ‘carrying’ method



Jottings

c

Make 6

 2 and 4	 3 and 3	 4 and 2
 0 and 6	 1 and 5	 5 and 1

Write the total.

$$36 + 29 = \boxed{65}$$

$$\begin{array}{r} 30 + 20 = 50 \\ 6 + 9 = 15 \\ \hline \end{array}$$

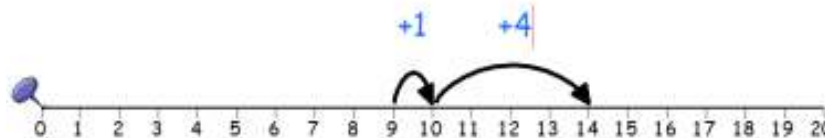


Addition - Number lines

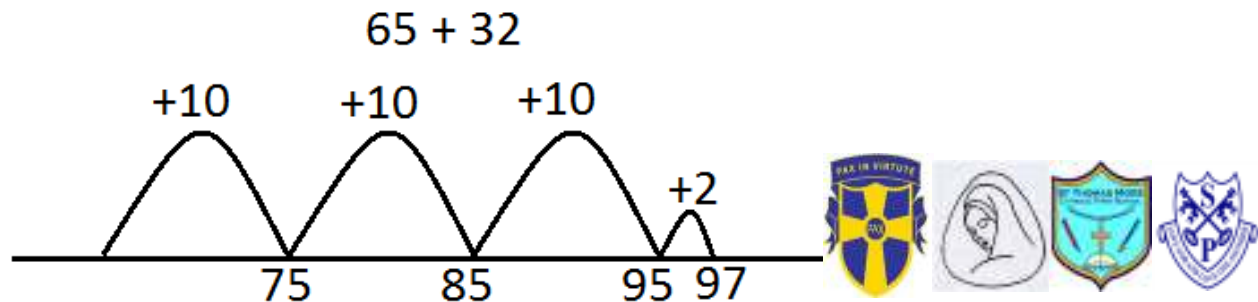
Are frequently used in each year group and provide children with a very visual method of calculation

* $5 + 9 = 14$

* Put the larger number first



* $65 + 32 = 97$



Addition - Partitioning

$$47 + 76 = (40 + 70) + (7 + 6) = 110 + 13 = 123$$

Use an expanded layout:

$$47 + 76$$

$$\begin{array}{r} 70 \quad 6 \\ +40 \quad 7 \\ \hline 110 + 13 = 123 \end{array}$$

Use an expanded layout:

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



Addition: Standard Method Column addition....

- * The final step, when the children have a sound grasp of place value & of the whole process

$$\begin{array}{r} * 364 \\ + 54 \\ \hline 418 \\ \hline 1 \end{array}$$

and with decimals

$$\begin{array}{r} 65.27 \\ +2.94 \\ \hline 68.21 \\ \hline 11 \end{array}$$



Subtraction - Progression

- * Mental calculations supported by:
 - * Jottings
 - * Number line
- * Written calculation:
 - * Partitioning
 - * Decomposition / re-grouping

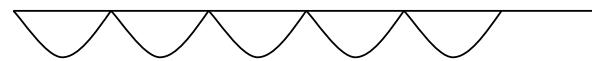


Subtraction: Number lines

- * Step 1: counting back in steps of 1

$$13 - 5 = 8$$

-1 -1 -1 -1 -1

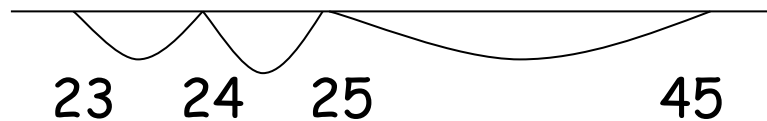


8 9 10 11 12 13

- * Step 2: counting back in larger steps

$$45 - 22 =$$

-1 -1 -20



or

$$45 - 22 =$$

$$45 - 20 = 25$$

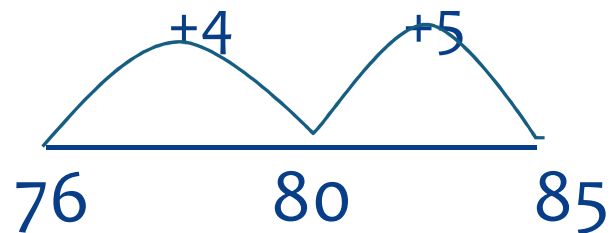
$$25 - 2 = 23$$



Subtraction: Number lines

* Step 3: finding the difference

$$85-76$$

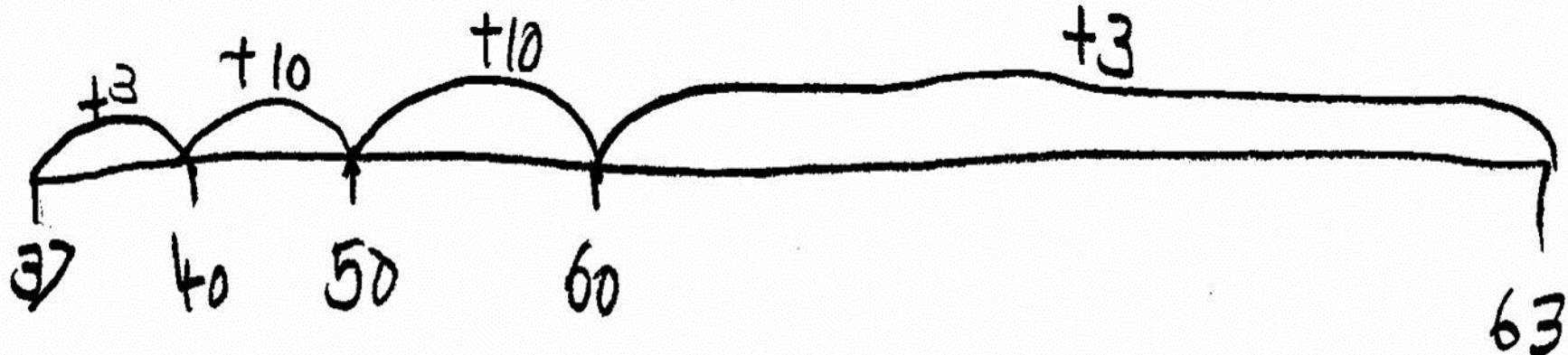


$$85-76=9$$



Write the answer.

$$63 - 37 = \boxed{26}$$



Subtraction: Partitioning

$$* 320 - 242 = 320 - (200) - (40) - (2) =$$

$$320 - 200 = 120$$

$$120 - 40 = 80$$

$$80 - 2 = 78$$



Subtraction: Partitioning (Expanded subtraction)

$$* 320 - 242$$

$$\begin{array}{r} 200 \quad \color{red}{1}10 \quad 1 \\ \cancel{300} \quad \cancel{20} \quad 0 \\ - \underline{200} \quad 40 \quad 2 \\ \underline{0 \quad + \quad 70 \quad + \quad 8} = 78 \end{array}$$



Subtraction: Decomposition or re-grouping

Decomposition:

	2.00		1.30		0.12
3.42	3.00	+	0.40	+	0.02
- <u>2.79</u>	<u>2.00</u>	+	<u>0.70</u>	+	<u>0.09</u>
<u>0.63</u>	<u>0</u>	+	<u>0.60</u>	+	<u>0.03</u>



Subtraction: Standard column method

- * The final step, when the children have a sound grasp of place value & of the whole process

2 13 1

3.42

-2.79

0.63



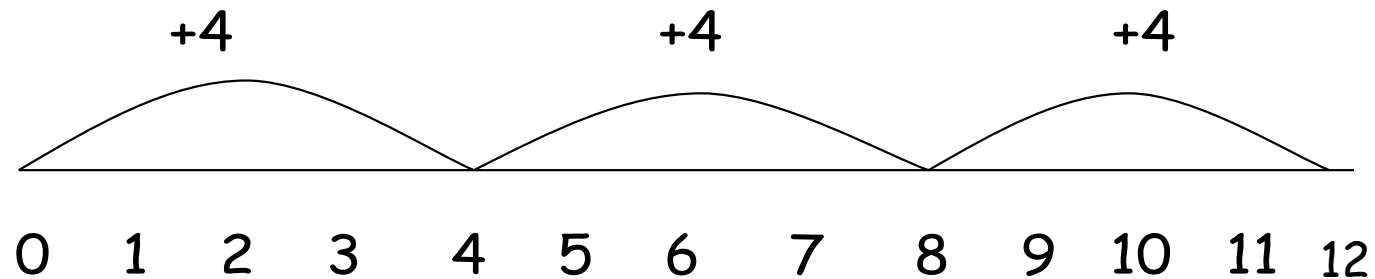
Multiplication - Progression

- * Mental calculation supported by:
 - * Jottings
 - * Number lines
- * Understanding of multiplication as:
 - * an array
 - * repeated addition
- * Grid method
- * Traditional column method



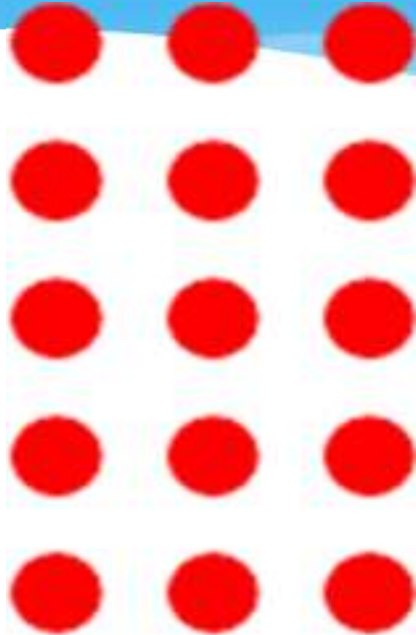
Multiplication – number lines

$$3 \times 4 = 12$$

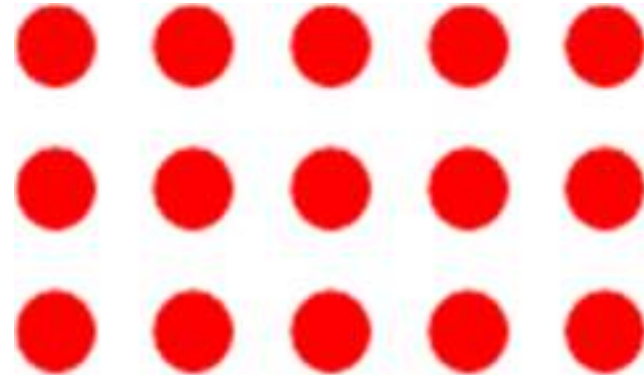


Multiplication: arrays

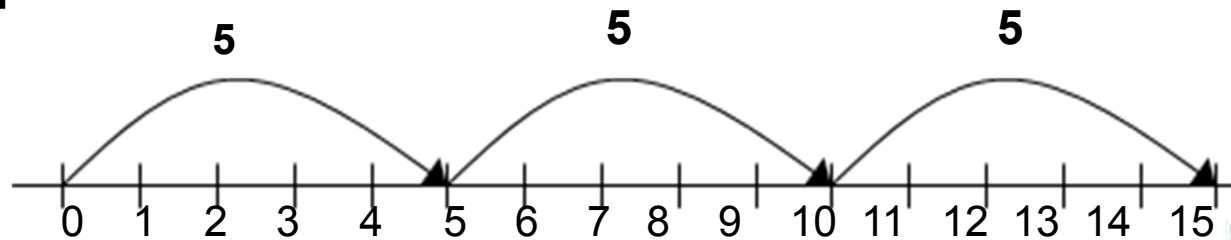
3×5



5×3



Using repeated addition



Multiplication: Grid method

17×5

x	10	7
5	50	35

$50 + 35 = 85$

$$\begin{array}{r} 50 \\ +35 \\ \hline 85 \end{array}$$

Multiplication: Grid method

38×72

x	70	2
30	2100	60
8	560	16

2160

+ 576

2736



Multiplication: Standard column method

The final step, when the children have a sound grasp of their tables, place value and of the whole process

$$\begin{array}{r} 354 \\ \times 26 \\ \hline 2124 \quad (354 \times 6) \\ + \underline{7080} \quad (354 \times 20) \text{ remember the zero the units column} \\ \hline \underline{9204} \end{array}$$



Multiplication: Standard column method with decimals

As with whole number multiplication, carry out the calculation in the same way (ignore the decimal point) then put it back in at the end.

3.45×2.6 – there are 3 digits in total after the decimal point in the question

$$\begin{array}{r} 354 \\ \times 26 \\ \hline 2124 \quad (354 \times 6) \\ + \underline{7080} \quad (354 \times 20) \text{ remember the zero the units column} \\ \hline 9204 \end{array}$$

Now make sure you have 3 digits after the decimal point in the answer
 9.204



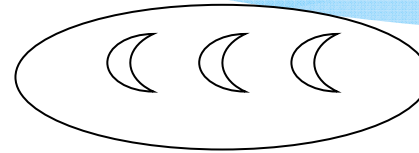
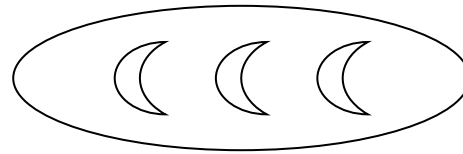
Division - Progression

- * Mental calculations supported by:
 - * Jottings
 - * Number lines
- * Understanding division as sharing and grouping.
- * Visualising division using:
 - * Arrays
 - * repeated subtraction
- * Chunking
- * Traditional column method

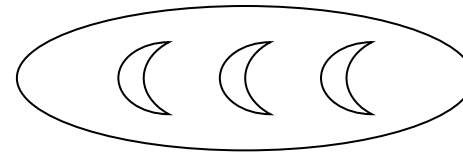
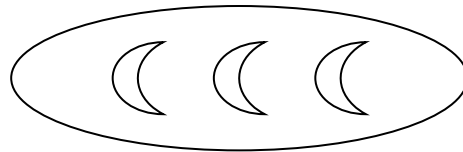


Division: grouping

Share 6 into 2 groups

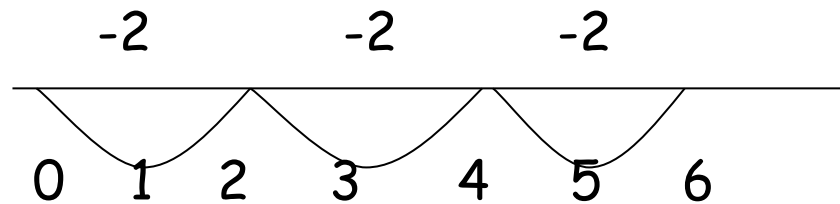


$$6 \div 2 = 3$$

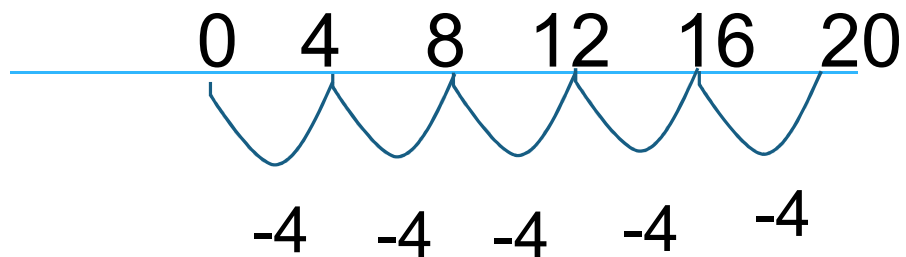


Division: repeated subtraction

$$6 \div 2 = 3$$

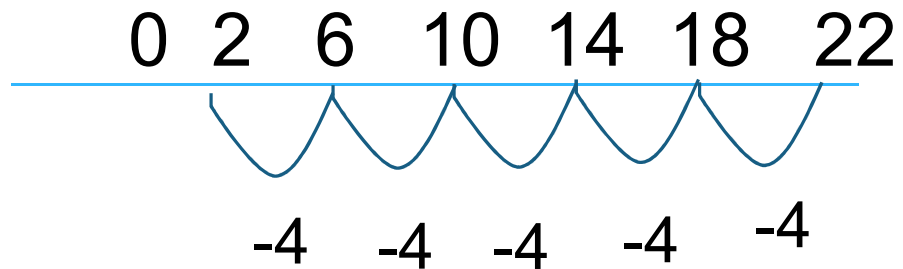


$$20 \div 4 = 5$$



Division: repeated subtraction

$$22 \div 4 = 5r2$$



Division: chunking

$$84 \div 4 =$$

$$\begin{array}{r} \underline{21} \\ 4 \overline{) 84} \\ - \underline{40} \\ 44 \\ - \underline{40} \\ 4 \\ - \underline{4} \\ \underline{00} \end{array}$$

since $4 \times 10 = 40$ can take off a chunk of **10**

we now have 44 left

since $4 \times 10 = 40$ we can take off a chunk of **10**

we now have 4 left

since $4 \times 1 = 4$ we can take off a chunk of **1**

we now have none left and have taken off **21** chunks altogether so the answer is 12



Division: chunking

$$288 \div 24 =$$

$$\begin{array}{r} \underline{12} \\ 24 \overline{) 288} \\ - \underline{240} \\ 48 \\ - \underline{48} \\ \underline{00} \end{array}$$

since $24 \times 10 = 240$ we can take off a chunk of **10**

we now have 48 left

since $24 \times 2 = 48$ we can take off a chunk of **2**

we now have none left and have taken off **12** chunks altogether so the answer is 12



Division: traditional method

$$\begin{array}{r} 12 \\ \hline 24 \overline{) 2848} \end{array}$$

24 into 2 won't go, carry the 2 across to the 8 to make 28. 24 into 28 goes once with 4 left over. Carry the 4 over to the 8 to make 48. 24 into 48 goes twice with none left over



Division: traditional method with remainders and decimals

$$\begin{array}{r} 12 \text{ r}8 \\ \hline 24 \) \ 22956 \end{array}$$

the same method as the previous slide, however this time there is a remainder of 8.

This can be written as a remainder, fraction or decimal

The answer can be written as:

12 r 8 as a remainder

or $12 \frac{8}{24}$ or as $12 \frac{1}{3}$ as a fraction in lowest terms

or 12.3333 as a decimal



Know your tables

- * **Year 2: 2X 5X 10X**
- * **Year 3: 2X 3X 4X 5X 8X 10X**
- * **Year 4: Derive and recall division facts for all tables up to 12 x 12**
- * **Year 5 and 6: Derive and recall quickly all division facts for tables up to 12 x 12**



How to help your child with mathematics



Parents can help by ...

- * Counting with your child
- * Playing number games
- * Involve your child in shopping activities
- * Involve your child when taking measurements or weighing items
- * Take note of numbers in real life e.g. telephone numbers, bus numbers, lottery numbers etc
- * Give your child opportunities to use money to shop, check change etc
- * Talking about the mathematics in football e.g.. How many points does your favourite team need to catch the next team in the division?
- * When helping your child calculate, use the method that they have been taught at school.



**Thanks for attending tonight's
Mathematics workshop**

