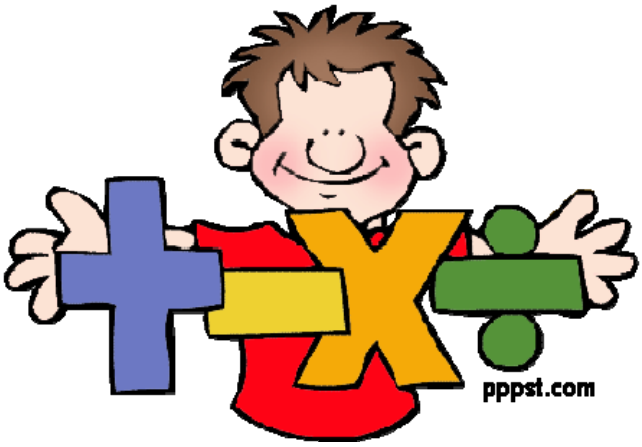


Maths At Sharmans Cross

Introduction

This handbook has been written to give you an insight into how Mathematics is taught at Sharmans Cross School, and provide some useful information of how you can help your child at home to enhance their mathematical learning. It is widely recognised that parents play a vital role helping their children achieve success at school and so the more information you have the better your support can be.

The National Numeracy Strategy

The National Numeracy Strategy was launched in 1998 with the aim of raising standards of numeracy for all children. The main objectives were to introduce a detailed scheme of work showing what is to be taught in each year group and that all children were to have a daily maths lesson, with more emphasis on mental strategies. The focus is on direct teaching, which is oral, interactive and lively.

"***It is a two-way process in which pupils are expected to play an active part by answering questions, contributing points to discussions, and explaining and demonstrating their methods to the class.***"

(NNS Framework)

Lessons in the school are structured as follows:

1. Oral and mental starter – up to 10 minutes. The teacher will teach all the children together on activities aimed at keeping mental skills sharp.
2. Main teaching activity - for approximately 40 minutes teaching a topic followed by activities and practice. The children might work for short periods in groups, in pairs or individually.
3. Plenary - this lasts for about 10 minutes. The teacher will draw the lesson to an end by discussing skills learnt, correcting

misconceptions, sorting out any problems, setting a challenge or discussing homework.

Mathematics at Sharmans Cross School

For mathematics children are taught in their classes and grouped according to ability within the class. This enables teachers to use maths across the curriculum in a variety of ways enabling the children to have access to maths at all stages of the day. More able children will be challenged, whilst children for whom maths is more difficult will receive the support they need from the teacher or learning support assistants.

The teachers and learning support assistants use a variety of resources and planning documents to support the teaching of the Numeracy Strategy, including commercially published materials and the use of ICT.

"They don't seem to have many sums in their books"

The National Numeracy Strategy places greater emphasis on mental mathematics. Our teaching now aims to equip children with the necessary skills to calculate in their heads as and when appropriate. In the early years of your child's schooling, you will not see as many calculations written down in your child's maths book. You may see "jottings" or notes, which they have used to help them reach an answer, or other written methods, which may be new to you. These are discussed in more detail later in this booklet.

The children are shown a variety of mental methods to use when adding, subtracting, multiplying or dividing. Many of these are based on number bonds (knowing which pairs of numbers need to be added to make another, e.g. 15 + 5 = 20) or on their times tables. You can help your child learn these at home.

During Year 3, children will be introduced to formal written methods. They may differ from those you use, as they will be still closely linked to the mental strategies the children have been using. It is a good idea to ask children to explain the methods they have been shown in school – try not to confuse them by showing them your method too!

"I was taught formal written methods and it worked for me!"

Some of you, like some of the teachers at Sharmans Cross, will have been taught formal written methods at an early age. This usually meant that children had to learn a method by "heart", often without any real mathematical understanding. Children who found this difficult were not equipped with any mental strategies to support them. They did not have the mental calculation skills to estimate their answer first, or indeed check to see if their final answer was reasonable.

Extensive research, carried out in this and many countries, shows that children's progress in mathematics is far greater when it is based on a sound understanding of mental methods. Introducing more formal written methods at a slightly later stage allows time for a sound mental understanding to develop.

Mathematical Vocabulary

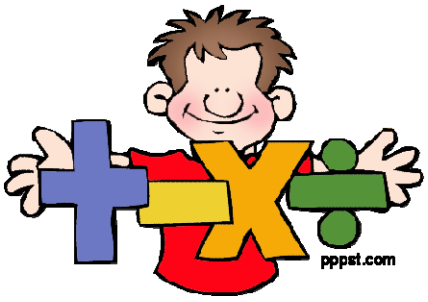
The language used when carrying out any calculation is extremely important. The children are taught specific vocabulary in maths lessons and this is built on throughout their school years. Mathematical vocabulary is introduced, revised at the beginning of each topic and children are encouraged to explain verbally or on paper the way they achieved their answer using the correct mathematical language. The vocabulary that relates to each specific concept is extensive, however some of the vocabulary used by the children when working on written methods is listed below.

Addition and Subtraction

Add, addition, more, plus, increase, sum, total, altogether, score, double, near double, how many more to make? Subtract, takeaway, minus, decrease, leave, difference between, half, halve, how many more/fewer is..than…?how much more/less is..than..? is the same as, equals, sign, inverse

Multiplication and Division

Lots of, groups of, times, product, multiply, multiplied by, multiple of, once, twice, three times, four times, five times..ten times, repeated addition, array, row, column, double, halve, share, equal groups of, divide, divided by, divided into, divisible by, remainder, factor, quotient, inverse



Routes Through Calculations

The following pages will outline the majority of routes through calculations for the four number operations of:

ADDITION SUBTRACTION
MULTIPLICATION **DIVISION**

NOT JUST NUMBER!

Maths is about much more than these four number operations and children are helped to develop their skills in a wide range of topics. Some children may not follow all of the routes, which are building blocks, through a particular calculation. Children also need to be aware of 2D and 3D shapes, handling data, measures and position & direction. It is very useful for children to have opportunities to talk about these in everyday situations:

- When you are shopping they can weigh items, add up the cost and count out the change.
- Tell you the time

- Use magazines to find out when a TV programme is on and set the video recorder.
- Use catalogues to work out the cost of things and whether they can afford them.
- Check the amount of petrol you are putting in the car.
- Notice charts and graphs in magazines and newspapers.
- Notice and name shapes, both 2D and 3D.
- Talk about units of measurements and their equivalents: mm/cm/m, g/kg, ml/l, seconds/minutes/hours.

"What can I do at home to help my child with maths?"

You are probably already doing a lot of mathematics at home without realising it. One of the best ways to help is to talk about any maths work they bring home from school. Sometimes it is more important to listen and let them explain what they are doing and why – even though their method may seem long-winded!

It is a good idea to help them learn their multiplication tables. A great deal of the mathematics is based on knowing number bonds and multiplication tables. Your child will therefore enjoy more success in their maths if they have a good understanding and knowledge of these.

Other ways to help at home would be to encourage your child would be to:

- Be able to read weighing scales (kitchen, bathroom)
- Use a calendar / diary
- Recognise coins and know their value
- Recognise shapes in the environment
- Play board games
- Explain their homework to you

The most important thing is to make sure maths is always fun. Pass on positive messages about maths. Never say, "I was no good at maths so you won't be able to do it either."

If you have any concerns regarding anything to do with maths, then please do not hesitate to speak to your child's teacher.

Methods of Calculation

We realise that all children will develop their mathematical understanding at different rates. You may find that your child is introduced to a new written method before or after other children in their class. This should not worry you, as it simply means that your child is using the method, which is both reliable and makes most sense to him/her. Furthermore not all children will need to go through each different method.

The following will give you some idea of the methods of calculation used in school.

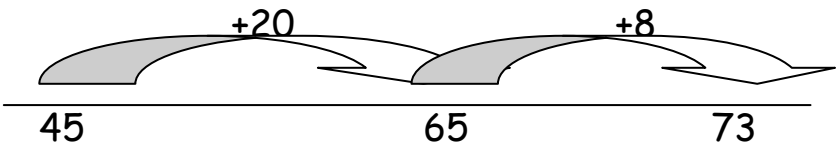
Addition

Before formal written methods are introduced, children are first taught methods that allow them to work out an answer in their heads. They use apparatus to help them, such as cubes or counters. Number lines and hundred squares are also useful aids that allow the children to develop their mental and informal methods. When children become fairly confident adding pairs of 2 digit numbers together mentally, more formal written methods are introduced. This will firstly be in the form of a number line.

Number Lines

Children may use the "empty number line" to help them record their mental method.

E.g. 45 + 28 = 73



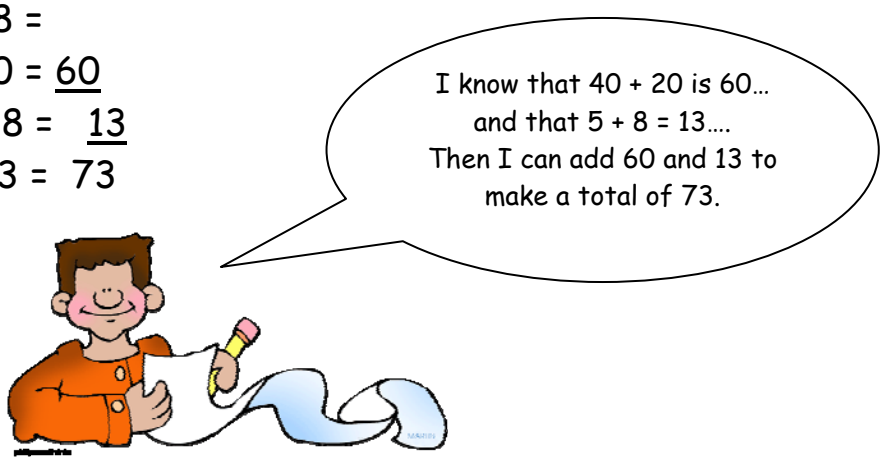
The children begin to write this down in an expanded form and use a method called 'partitioning' to help them work out the answer.

E.g. 45 + 28 =

40 + 20 = 60

5 + 8 = 13

60 + 13 = 73



This leads on to the more recognisable vertical method, where children add the units first

E.g.

```
  45                    45
 +28        ------>    +28
  13                    73
  60                    1
  73
```

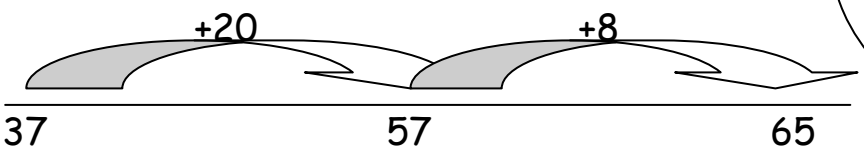
This leads on to larger, and then decimal numbers.

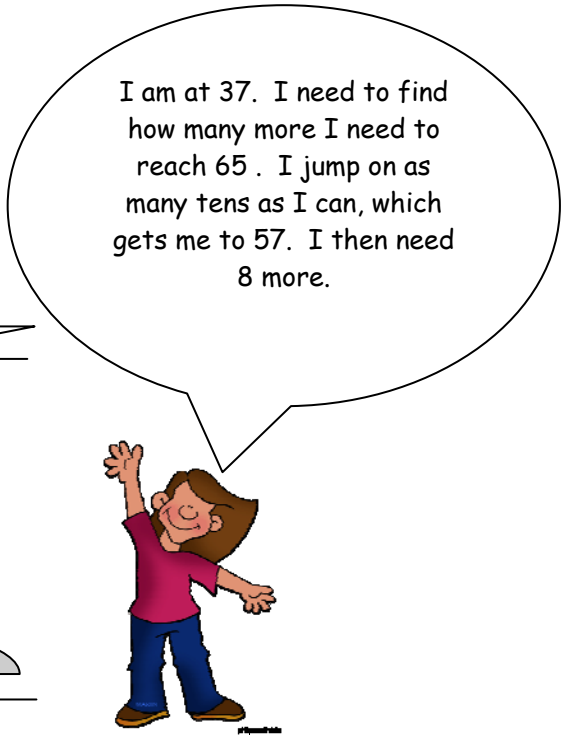
Subtraction

Subtraction is taught alongside addition so that the children understand the important link between the two. As with all four basic operations (+ , - , x , ÷ ,) early work will focus on mental methods. This may involve the children using cubes, counters, hundred square or number lines to help them calculate an answer

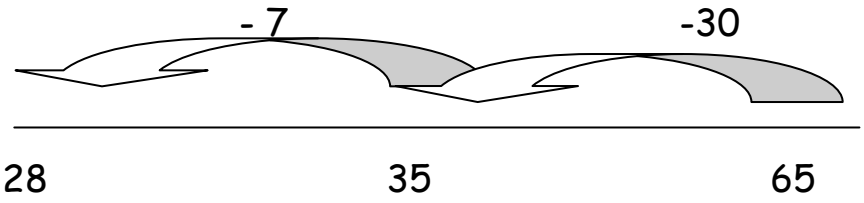
Children are shown two methods to subtract mentally, 'counting up' and 'counting back'. Depending upon the numbers involved one method is more appropriate than the other. As with addition, the 'empty number line' is used to help record their mental methods for subtraction.

E.g. 'Counting up'65 – 37 =





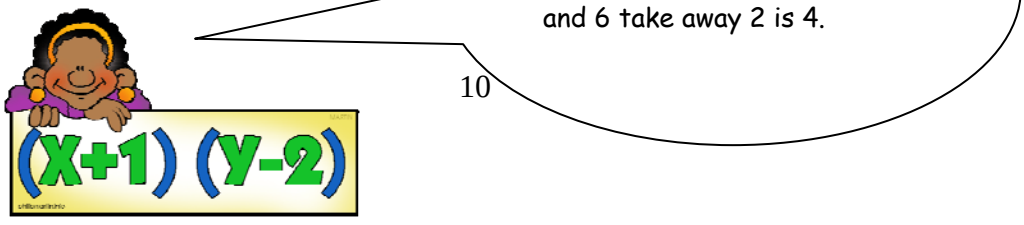
'Counting back' 65 – 37 =



Before more formal written methods are introduced, it is important that children know how to partition (split) numbers into tens and units, e.g 76 = 70 + 6, and a teens number, e.g. 76 = 60 + 16.

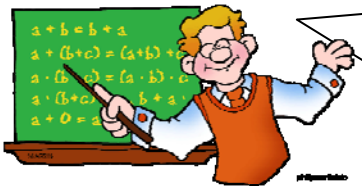
Children use this method when introduced to the expanded method of subtraction.

E.g.	76	70	6
	-32	30	2
		40	4



The size of the numbers is then increased to 3 or 4 digit numbers. Later children will subtract decimal numbers, with increasing numbers of decimal places.
This is further extended to exchanges being made from hundreds to tens as well as tens to units.
E.g.

		130	
	200	~~30~~	15
345	~~300~~	~~40~~	~~5~~
-167	100	60	7
	100	70	8



5 subtract 7 is difficult, and so we exchange 1 ten for 10 units. This gives us 3 tens (or 30) and 15 units. Now 15 subtract 7 is 8.
30 subtract 60 is difficult, so we exchange 1 hundred for 10 tens. This gives us 2 hundreds (or 200) and 13 tens (or 130). Now 130 subtract 60 is 70, and 200 subtract 100 is 100.

This method then leads on to the compact that many adults use. It is vitally important that the children are taught this method in the step by step approach as they understand why they are writing down the steps rather than just following a set of rules.

Multiplication

Children will first experience multiplication as the repeated addition of different groups of objects. E.g. counting pairs of socks on a line, or finding out the number of bread slices required when making sandwiches. They are then taught to find patterns and begin to add groups of objects together e.g. 3 lots of 5 = 3 x 5. They are taught multiplication tables in a variety of ways in school as children learn in many different ways.

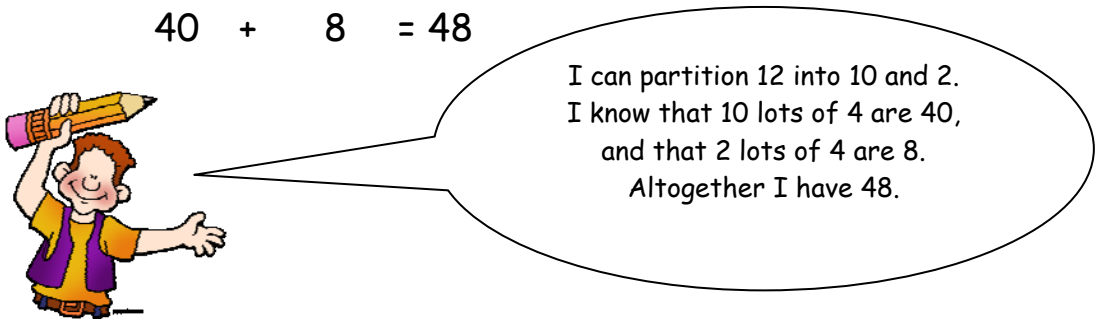
Your children do not learn their tables in strict numerical order. The 2, 5 and 10 times tables are learnt first, followed by the 3 times table. The 4 times table is learned by doubling the 2 times table as is the 6 times (double 3 times) and 8 times (double 4 times).

The 7 times is learned separately and children are taught to recognise that the 9 times is equivalent to multiplying by 10 and adjusting e.g. 6 x 9 = (10 x 6) – 6. It is important that children learn the multiplication tables in a way that suits them. Some pupils may find it easier to use songs and rhymes. Whichever way a child chooses, it is vitally important that your child begin to learn their tables 'by heart'. Your child's class teacher will be able to indicate which tables he/she must know.

Partitioning (splitting) numbers is used again at the first stages of the written method we use in school.

E.g. 12 x 4 → (10 x 4) + (2 x 4)

40 + 8 = 48



Larger numbers can also be calculated in this way, which leads on to the GRID METHOD. The children partition the numbers to be multiplied together and these are written at the sides of the grid.

E.g. 24 x 6

x	20	4
6	120	24

I know that 2 lots of 6 are 12.
Twenty is ten times bigger than 2, so my answer needs to be ten times bigger… so 20x6 is 120.
I know that 4 lots of 6 are 24…
Altogether, 120 add 24 is 144.

This is extended to 2 digit x 2 digit

E.g. 35 x 42

x	30	5	
40	1200	200	1400
2	60	10	70 = 1470.

The compact method is then introduced.

E.g. 35 x 42

35
X 42
10 (5x2)
60 (30x2)
200 (5x40)
1200 (30x40)
1470

35
x42
70 (35x2)
1400 (35X40)
1470

Same calculation different layout

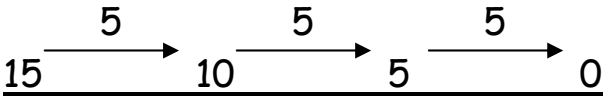
Multiplication with decimal numbers will be taught in a similar way.

Division

Division is taught as both sharing and 'grouping'. e.g. 'Sharing 12 apples between 4 people' or 'How many groups or "chunks" of 3 are there in 15?' This relates to the children's knowledge of multiplication tables and therefore it is important for the children to practise learning their tables and division facts together,

e.g. $3 \times 5 = 15$, $5 \times 3 = 15$, $5 \div 3 = 5$, $15 \div 5 = 3$

Children are taught to record their first written form of a division on a number line. For a calculation such as $15 \div 5$, the children start at 15 and jump back in steps of 5 until they reach zero. The answer is the quantity of groups of five needed to reach zero.

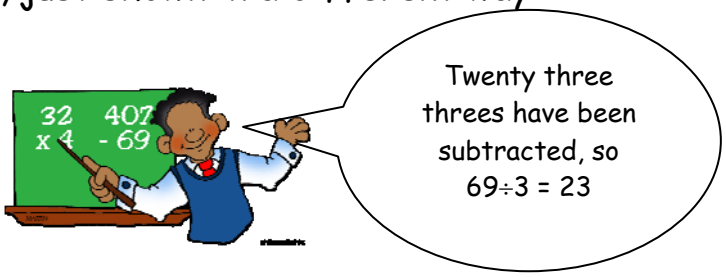


= 3 groups = $15 \div 5 = 3$

Using their knowledge of the multiplication tables, the children can take away more than one 'chunk' at a time. This usually starts off with taking away 'chunks' of 10, then smaller 'chunks'.

This is then set out vertically, just shown in a different way:

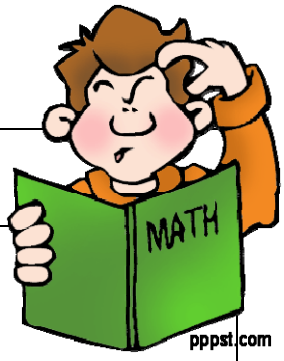
69
-30 (10 x 3)
39
-30 (10 x 3)
9
- 9 (3 x 3)
0



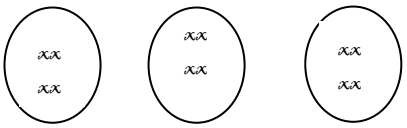
'23 threes have been subtracted'

Larger numbers and decimals are introduced later and calculated in a similar way.

Glossary of Maths Terms



Term	Definition
Partition	To split a number into smaller components E.g. 235 = 200 + 30 + 5 Or 7 = 5 + 2 = 4 + 3 and so on
Number sentence	Written horizontal calculation E.g. 45 + 34 = 45 + 30 = 75 + 4 = 79 Or 56 + 23 = 79 I won 5 marbles and then I won 3 more. I have 8 marbles
Empty number line	A hand drawn line used to assist with a mental calculation. E.g. +10 +10 +10 +10 +4 26 36 46 56 66 70
Jottings	Any method of recording numbers / strategies that is not formalised. E.g. use of empty number lines, number sentences.
Vertical Method	Any written method set out in a vertical format. E.g. 46 + 27 6+7 = 13 40+20 = 60 73
Expanded Method	A written method that acts as a 'stepping stone' between a mental method with jottings and a standard written method. E.g. 274 200 70 4

	+ 123 100 20 3 300 90 7
Standard Written Method or Compact Method	An efficient written method. E.g. 376 6 add 8 is 14, which is 10 and 4. 4 in the units and + 148 1 carried to the tens column. 70 + 40 is 110 and the 524 extra 10 is 120. Write the 2 tens in the tens and 1 1 put the 1 hundred in the hundreds column. 300 and 100 is 400 and add the additional hundred making 500. The answer is 524
Grid Method	Multiplication written method involving the partitioning of numbers within a grid structure. E.g. 34 x 27 X | 20 | 7 30 | 600 | 210 | 810 4 | 80 | 28 | 108 918
Sharing	A form of division where a number is shared equally into sets. E.g. There are 12 cub scouts and 3 tents. How many cubs will there be in each tent ? 12 ÷ 3 = 4 

Grouping	This is also known as repeated subtraction. A form of division where groups of the divisor are subtracted. E.g. There are 12 cub scouts to be placed into teams of three. How many teams can we make? 12 ÷ 3 = 4 12 - 3 (1 x 3 or 1 team) 9 - 3 (1 x 3) 6 - 3 (1 x 3) 3 - 3 (1 x 3) 0 (4 x 3) = 4 teams
Chunking	A strategy used in division involving repeated subtraction or the taking away of 'chunks' of the divisor. E.g. 256 ÷ 7 36 remainder (rem) 4 7) 256 - 70 (10 x 7) 186 - 140 (20 x 7) 46 - 42 (6 x 7) 4
Short Multiplication	Multiplication by a single digit E.g. 34 x 3, or 243 x 8
Long Multiplication	Multiplication by a number with two or more digits. E.g. 34 x 13, 243 x 28, 26 x 3.4
Short Division	Division by a unit. E.g. 34 ÷ 3, or 243 ÷ 8

Long Division	Division by a number with two or more digits. E.g. 34 ÷ 13, or 243 ÷ 28