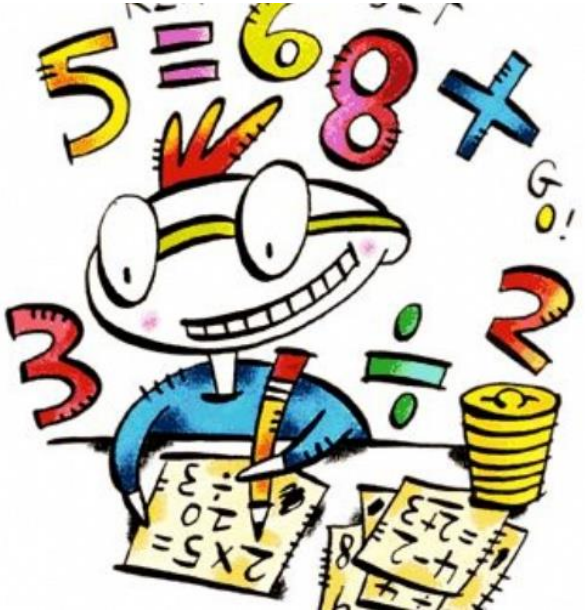
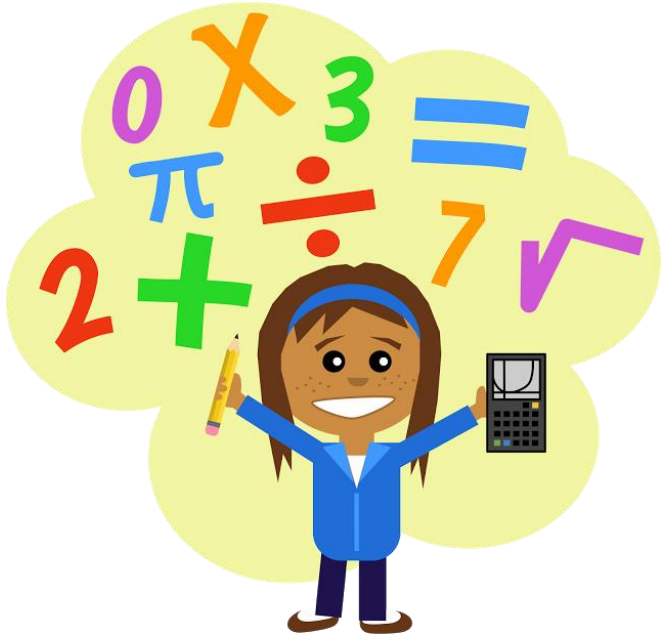
Maths Mastery
Parent Information Evening





The National Curriculum for Maths aims to ensure that all pupils……

…..reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language …

The National Curriculum for Maths aims to ensure that all pupils

… become **fluent**

… **reason** mathematically

… and can solve problems

The memorisation myth

- One of the biggest challenges is ensuring children retain the facts they learn in Maths

- How can we ensure children remember number bonds, times tables, column subtraction, names of all 3D shapes……..?

- Academic research shows that rote memorisation and rehearsal alone are not effective. A deeper understanding of mathematical concepts is needed.

What is ‘deep’ mathematical learning?

Maths is an **interconnected** subject in which pupils need to be able to move fluently between representations of mathematical ideas.

Pupils should make rich connections to develop **fluency**, mathematical **reasoning** and competence in solving increasingly sophisticated problems.

Mastery of Maths

(Deep and sustainable learning)

Interconnectivity

Fluency

Achievable for all

Problem Solving

Reasoning

Making connections/ interconnectivity

25% of 28 = 7

7 x 40 = 280

28 ÷ 7 = 4

7 x 4 = 28

280 ÷ 7 = 40

¼ of 28 = 7

4+4+4+4+4+4+4 = 28

(7 x 2) + (7 x 2) = 28

Fluency

Which of these fits between 500 and 550?

(Estimate mentally, don't try to work out exact answers)

3 x 149

half of 1073

93 x 6

4550 ÷ 9

500 x 1.2

220 ÷ 0.42

Reasoning

Which of these fits between 500 and 550?

3 x 149	half of 1073	93 x 6
4550 ÷ 9	500 x 1.2	220 ÷ 0.42

Can you explain how you approached this?
Why did you do it in this way?

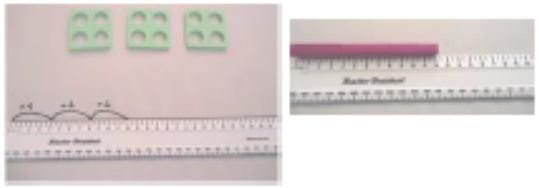
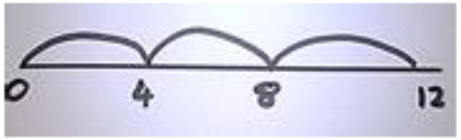
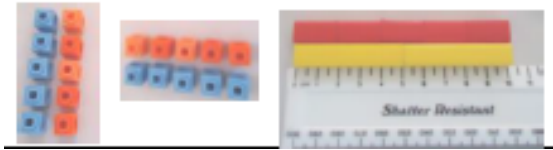
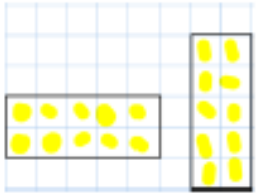
What does this look like in the classroom?

- Mastery for all
- Mixed ability pairings within year groups
- “Ping Pong” teaching and learning
- More of the Concrete Pictorial Abstract approach
- Use of stem sentences
- Provides “building blocks”
- Makes links in learning of mathematical concepts
- Equips children for mastery in life (not just SATs) – aim is to enable them to be secondary-ready

Example of CPA – Concrete Pictorial Abstract

Multiplication-

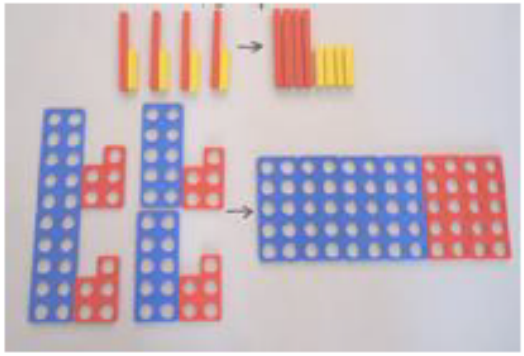
Key language which should be used: double times, multiplied by, the product of, groups of, lots of, 'is equal to' 'is the same as'

Concrete	Pictorial	Abstract
Repeated grouping/repeated addition (does not have to be restricted to cubes) 3 x 4 or 3 lots of 4 	Children to represent the practical resources in a picture e.g. XX XX XX XX XX XX Use of a bar model for a more structured method 	3 x 4 4 + 4 + 4
Use number lines to show repeated groups- 3 x 4 	Represent this pictorially alongside a number line e.g: 	Abstract number line **3 x 4 = 12** 
Use arrays to illustrate commutativity (counters and other objects can also be used) **2 x 5 = 5 x 2** 	Children to draw the arrays 	Children to be able to use an array to write a range of calculations e.g. 2 x 5 = 10 5 x 2 = 10 2 + 2 + 2 + 2 + 2 = 10 5 + 5 =10

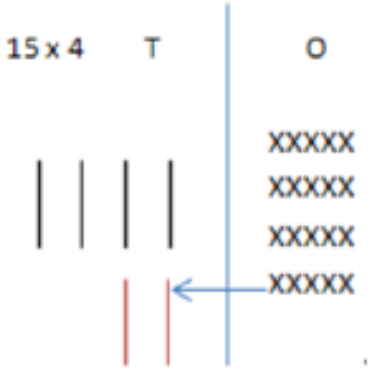
Example of CPA – Concrete Pictorial Abstract

Partition to multiply (use numicon, base 10, Cuisenaire rods)

4 x 15



Children to represent the concrete manipulatives in a picture e.g. base 10 can be represented like:



Children to be encouraged to show the steps they have taken

4 x 15

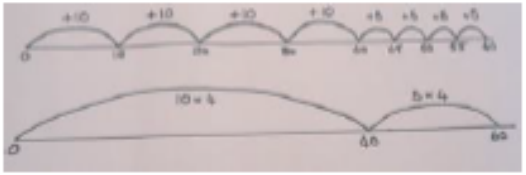
10 5

10 x 4 = 40

5 x 4 = 20

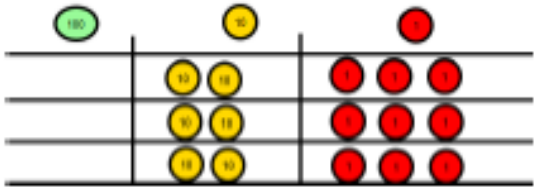
40 + 20 = 60

A number line can also be used



Formal column method with place value counters or base 10 (at the first stage- no exchanging) 3 x 23

Make 23, 3 times. See how many ones, then how many tens



Children to represent the counters in a pictorial way

Children to record what it is they are doing to show understanding

3 x 23

20 3

3 x 20 = 60

3 x 3 = 9

60 + 9= 69

$$\begin{array}{r} 23 \\ \times\ 3 \\ \hline 69 \end{array}$$

Why move to this approach to teaching and learning in Maths?

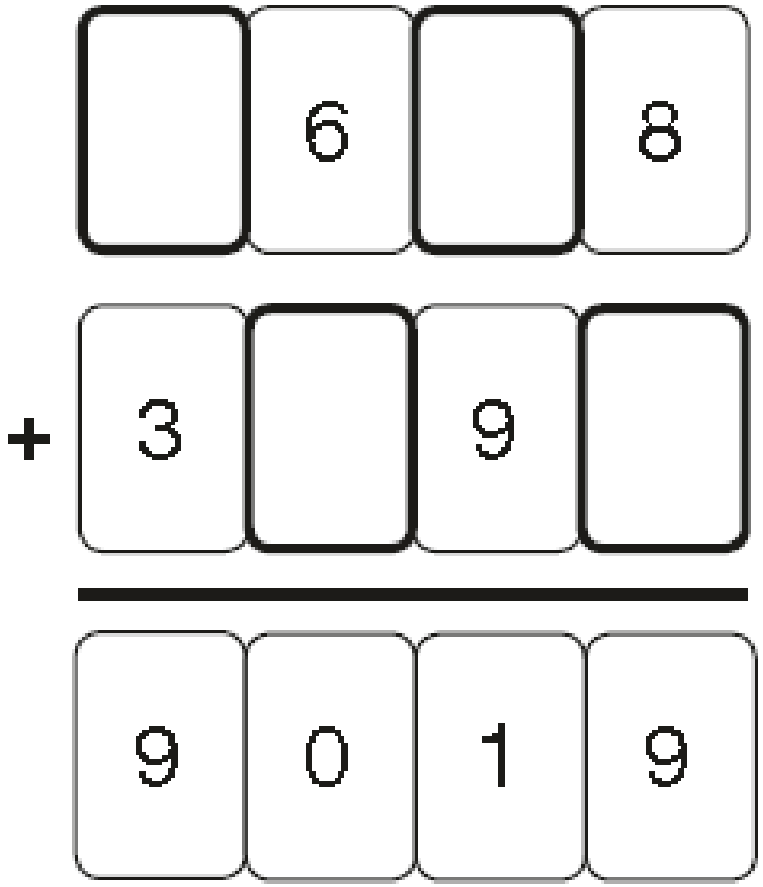
The new curriculum stressed that the objective of teaching was to create deeper understanding rather than to accelerate pupils into new content.

To achieve this deeper understanding for all pupils, we will use concrete resources, visual representations and more opportunities for explaining and reasoning.

Challenge and stretch

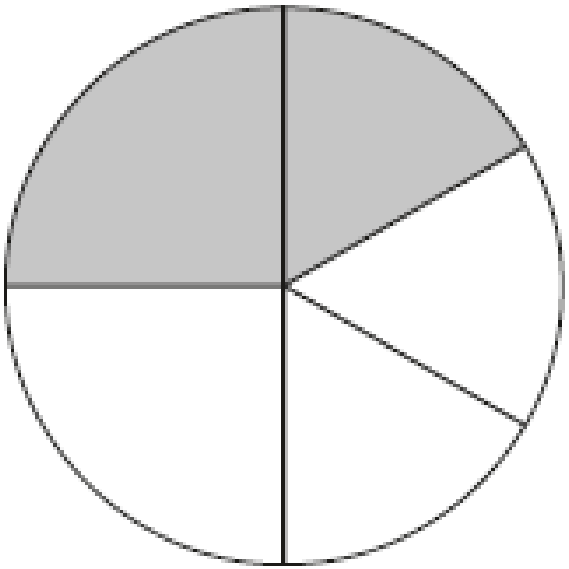
Pupils who demonstrate a secure level of understanding are provided with opportunities which require them to apply this understanding to a range of more challenging and unfamiliar contexts.

Example of challenge and stretch



Example of challenge and stretch

In this circle, $\frac{1}{4}$ and $\frac{1}{6}$ are shaded.



What fraction of the whole circle is **not** shaded?

We remember …

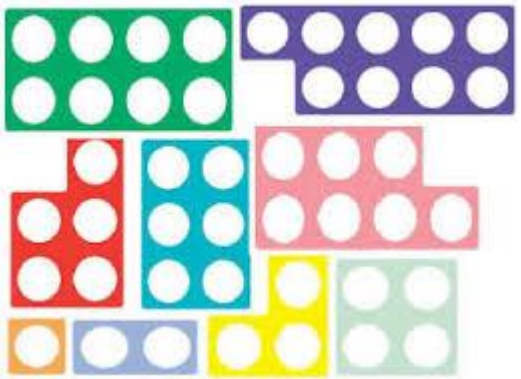
10% of what we read
20% of what we hear
30% of what we see
50% of what we see and hear
70% of what we discuss with others
80% of what we personally experience
95% of what we teach others

- Edgar Dale

What does this mean for children at St Gilbert's Primary?

- Use of more concrete resources
- Further opportunities to explain methods verbally and in writing
- A balance of whole class interactive "Ping Pong" teaching and independent practice
- More complex activities - children to explore and investigate connections between different mathematical concepts

Concrete resources



Numicon shapes

Cuisenaire rods

Multilink cubes

Counters

Dienes apparatus/Base 10

It's not that I'm so smart; it's just that I stay with problems longer.
~Albert Einstein

Millions saw the apple fall, but Newton asked WHY.

The only way to **learn mathematics** is to **do mathematics**.