



OUR APPROACH TO MATHS TEACHING



CHANGES TO THE NATIONAL CURRICULUM – WHY?

- International tests were taken to measure education standards in Europe, North and South America, Australasia and parts of the middle East and Asia.
- When the results were published, it showed that the UK was falling behind other countries, failing to make the top 20 in maths, reading and science.
- These results triggered a change.

How were the decisions on the curriculum changes made?

- The government appointed a panel of experts, which included subject specialists and teachers, to devise the new curriculum.
- Their brief was to emulate the world's most successful school systems, including those in Hong Kong and Singapore.
- The aim was to combine best international practice (including Hong Kong, Singapore and Finland) with best practice from schools in England in order to raise standards.
- Though there are many differences between the education systems of England and those of east and south-east Asia, experts believe we can learn from the ‘mastery’ approach to teaching commonly followed in these countries.

THE MATHS CURRICULUM (2014)

- The National Curriculum focuses heavily on mathematical **vocabulary, talking, questioning** and having a **deeper** understanding.

Aims:

To ensure that all pupils:

- become **fluent** – develop the ability to recall and apply knowledge quickly and accurately.
- **reason mathematically** - finding relationships and developing an argument, justification or proof using mathematical language.
- can **solve problems** - applying their knowledge to a variety of problems.

Some topics have changed to different year groups or Key Stages and the expectations for some year groups have increased. E.g.

- By the end of Year 4 children should know all times tables off by heart up to 12x12
- By the end of KS2, they should know formal methods of long multiplication and long division and have a more complex understanding of fractions
- Change to vocabulary and practical resources— ones not units!

WHAT IS A 'MASTERY' APPROACH?

What does it mean to **master** something?

- I know how to do it
- It becomes automatic and I don't need to think about it- for example driving a car
- I'm really good at doing it – painting a room, or a picture
- I can show someone else how to do it.

What is **Maths** Mastery?

- Achievable for all
- High expectation that all pupils are capable of achieving high standards in mathematics.
- Using practical resources to aid the learning process
- Talking maths
- Deep and sustainable learning
- The ability to build on something that has already been sufficiently mastered and 'deepen' their understanding
- The ability to reason about a concept and make connections
- Being fluent – recalling and applying number facts quickly and accurately

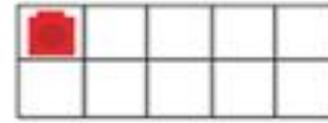
SOME PRINCIPLES...

We have adapted our teaching, keeping aspects which work very well but developing a 'Mastery' approach

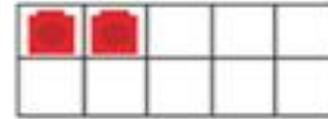
Most lessons will feature:

- ✓ Practical resources
- ✓ Problem solving and reasoning opportunities that challenge all children at their own level in order to deepen understanding and develop mathematical thinking
- ✓ Planned opportunities for peer, pair and group talk using correct terminology
- ✓ Lessons will sometimes, but not always, follow a structure that develops the use of a practical example, through to a visual task then to questions that involve the abstract (CPA)
- ✓ Lessons linked to real life and familiar contexts when possible
- ✓ Questioning is key – Why? How? What if...? Convince me!

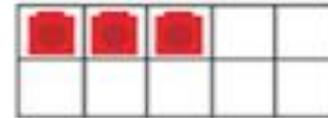
CONCRETE PICTORIAL ABSTRACT (CPA)



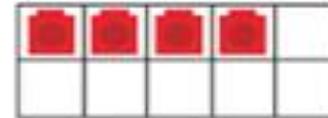
1



2



3



4

Using objects that can be moved, grouped and rearranged to help them make sense of a problem (plastic fruit, counters, cubes etc.)

Meaningful pictures/
drawing them

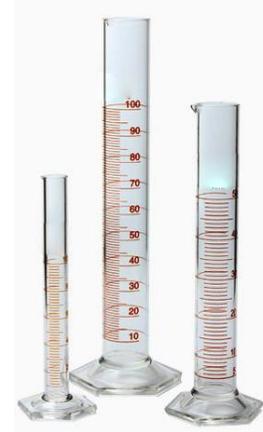
Numbers or symbols

RESOURCES AND REPRESENTATIONS OF MATHEMATICS

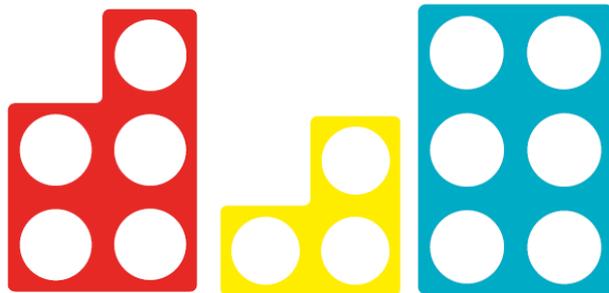
Resources to help build concepts



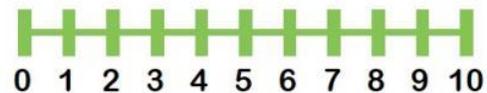
Place value arrows



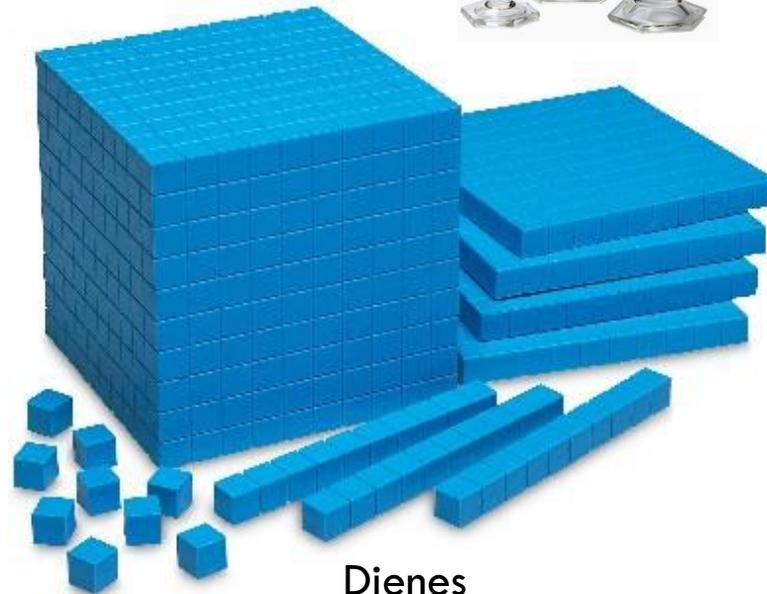
Place Value counters



Numicon



Number lines



Dienes



Multi link



KS1

- From a young age, children need to **see** and understand **different representations** of numbers and use these when solving problems. (Formal methods for addition, subtraction, multiplication and division are introduced in KS2)

E.g.

- $3+2 = 5$ may seem like a simple calculation but the numbers could represent many different things.
3 objects, 3 counters, 3 people, 3 groups, 3 on a number line
- In addition, the complete statement $3 + 2 = 5$ itself is a generalisation which can represent many different situations.

E.g. John has 3 sweets and Jill has two more, five in total

A plant that is 3cm tall grows by an extra 2cm and is now 5cm tall

Spending £3 and then spending another £2 is equivalent to spending £5 in one payment.

- Give children a context (real life)
- Practical tasks involving 'real' objects or mathematical equipment (counters, fruit, toys, cubes etc.)
- Recording of early addition and subtraction work could include practical equipment or pictorial form.

YEAR 1

Objective: To add and subtract 1-digit and 2-digit numbers to 20, including 0

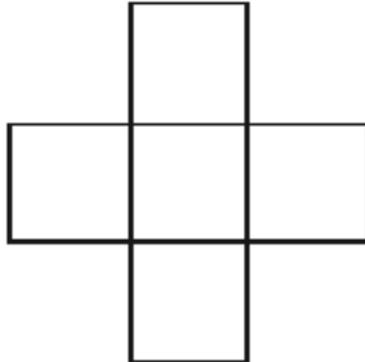
Examples:

I'm thinking of a number.
I've added 8 and the answer is 19.
What number was I thinking of?
Explain how you know.

Together Sam and Tom have 19 football stickers.
Write down **all** the possible sticker combinations they might have.

'If you add together six 0s the answer is 6.'
Do you agree?
Explain your reasoning.

Write the numbers 1 to 5 in the squares so that each row and column adds up to the same number, called the 'magic number'. What is the 'magic number'?



Robert has 5 more cherries than John.
John has 11 cherries.
How many does Robert have?

Write a number sentence you would use to solve the problem.

$$\square + \square = \square$$

Complete:

$$3 + \square = 10$$

$$10 - \square = 3$$

$$13 + \square = 20$$

$$20 - \square = 13$$

$$\square + 5 = 10$$

$$10 - 5 = \square$$

$$15 + \square = 20$$

$$20 - \square = 15$$

$$\square + \square = 10$$

$$10 - \square = \square$$

$$16 + \square = 20$$

$$20 - \square = 16$$

What do you notice?

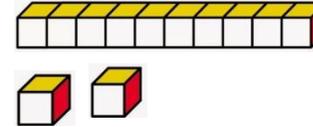
Children may 'know' number pairs totalling ten but are they able to use them to support other calculations? For example, when probed to say, 'If you know $3 + 7 = 10$, what else do you know?' They should reply with answers, such as $13 + 7 = 20$ or $4 + 7 = 11$

DEPTH

- Bigger numbers don't necessarily mean harder maths
- Children must fully understand the **value** of numbers and the different representations from a young age

E.g.

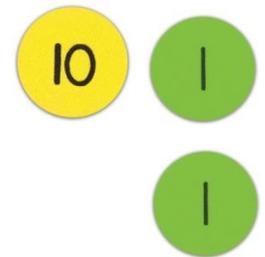
12



T	O
●	●●

1 ten and 2 ones

twelve



$$12 = 12 + 0$$

$$15 - 3$$

$$5 + 5 + 2$$

$$12 = 11 + 1$$

$$12 = 10 + 2$$

$$12 = 9 + 3$$

$$2 \times 6$$

double 6

half of 24

T	O
1	2

HOW CAN YOU SUPPORT YOUR CHILDREN WITH THEIR LEARNING?

- Supporting weekly homework – linked to learning/consolidation
- Times tables - fundamental
- Telling the time
- Number facts – (number bonds, doubles, prime numbers etc.)
- Athletics
- Maths games on the internet/Apps – maths can be fun!
- Shopping
- Reinforcing growth mind-set messages

GROWTH MIND-SET

✓ We have a Growth Mind-set!

*"We all see
Maths differently
and learn in
different ways."*

*"Speed is not
important.
Thinking
mathematically
is important."*

*"Making mistakes helps
us to learn."*

**GROWTH
MINDSET**

*"We need to have a
positive attitude and
say, 'I can do it!' If we
find it hard, we keep
going!"*

*"When we make a
mistake, our brain
grows!"*

*"I like
new th*

"stick to what... ow"

"I'm either good at it or I'm not"

"My abilities are unchanging"

*"I can either do it,
or I can't"*

"Chall

*"Failure is the
best opportunity to grow
abilities*

*"Failure is a
best opportunity to grow*

Research shows...

- *Children pick up messages about maths from their parents.*
- *Parents' experiences and opinions of maths can change their child's maths learning and achievement.*
- *Teachers and parents need to replace sympathetic messages such as "Don't worry, maths isn't your thing" with positive messages such as "You can do this!"*
- *We can all achieve with a positive attitude!*