Mastery in Mathematics

Today we would like to give you an overview of how mastery in mathematics is delivered at North Stainley. In order that we support fidelity when linking the teaching of maths across home and school.
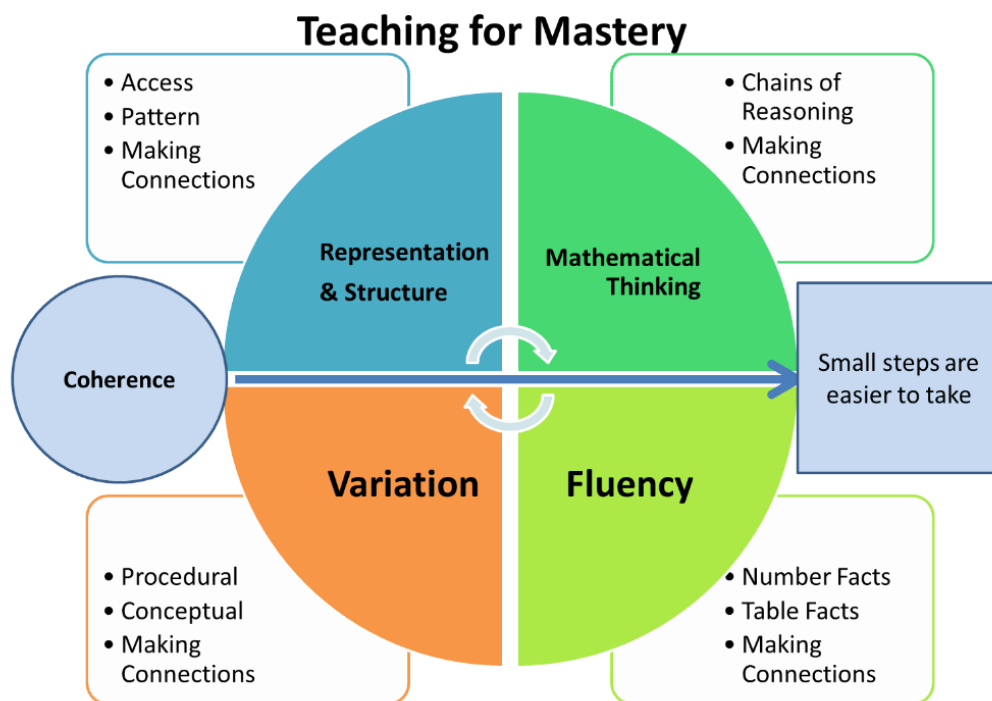
Why do we teach what we do?

The national curriculum for mathematics aims to ensure that all pupils:

- Become fluent in the fundamentals of mathematics
- Reason mathematically
- Solve problems.

The Mastery Approach

The Five Big Ideas of Mastery

What does this mean?

▶ Plan systematically for cohesion.

▶ Small steps for a depth in understanding of knowledge

▶ **Fluency** across the curriculum and operations ie: place value, number bonds, times tables, days, months etc

Key facts are learnt to automaticity to avoid cognitive overload in the working memory and enable pupils to focus on new concepts:
Key facts are developed to automaticity through practise at home and formative assessment at school.

▶ **Representations** Concrete, pictorial and abstract give a structured visual understanding.

▶ **Variation**, how many ways can a concept be varied, pupils learn to see concepts out of context.(Simplest form, 3+1=4 4=3+1 pupils learn to make connections. ¼... quarter of the clock, quarter past, quarter to....

▶ **Reasoning and mathematical thinking**, digging deeper, learning to apply concepts systematically, to reason and explain how they reach a solution to a problems.

Key features of the Maths Mastery Curriculum at our school:

▶ High expectations for every child – maths mastery rejects the idea that a large proportion of people 'just can't do maths'

▶ Whole-class interactive teaching (ping-pong teach a bit, children complete a practical task and repeat through out a lesson)

▶ Fewer topics, smaller steps, greater depth

▶ Fluency (crucial) to support the learning of new concepts (Maths passports)

▶ Continuous concrete and visual support for learning

▶ If a pupil fails to grasp a concept or procedure – early intervention provided

What does a typical 'Mastery lesson' look like?

Satrter: Getting the brain working – are we ready to learn? Fluency.

EYFS – song, rhyme, counting game

https://www.youtube.com/watch?v=OCxvNtrcDls

Key stage 1 – counting stick, fluency games and activities.

Key stage 2 – Progression from fluency to reasoning.

Have a go at this example starter task...

5 0 7 2 9

Arrange the digits above to make:

a) The smallest number possible

b) The largest number possible

c) A number with a zero in the hundreds place

d) What is the largest even number you can make?

e) What is the smallest odd number you can make?

What is the difference between the largest and the smallest number you can make?

Starter Task – something a bit more challenging!

Sam multiplies a number by 100.

Her answer has 3 digits.

In the answer, the hundreds and ones digits are the same.

The sum of the digits is 10.

What number could Sam have started with?

Are there any others?

Answer-

Sam multiplies a number by 100.

Her answer has 3 digits.

In the answer, the hundreds and ones digits are the same.

The sum of the digits is 10.

What number could Sam have started with?

Answer: 5.05

Are there any others?

Explanation

No the answer is limited by the ones and hundreds digits being the same and also that they total 10.

Main part of mastery maths lesson

Pupils are introduced to the learning of this lesson – this may be new learning or a continuation of learning from a previous day.

Pupils will be following the same learning but some will be supported by:

Concrete – actual objects are used to help solve problems and complete calculations

Visual – representations and drawing are used to approach and solve problems and calculations

Use of concrete apparatus

- Dienes – Base Ten
- Cuisenaire rods
- Numicon
- Place value boards
- Place value counters
- Real life objects
- Large squared paper

Use of visual support

- Visual images e.g. equivalent fractions
- Multiplication grids/flexi tables
- Place value books
- Number lines
- Arrow cards
- Jottings
- Bar models

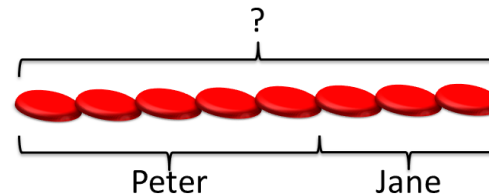# Bar Modelling to solve Addition: Pictorial and Abstract..

Model (Version 1)
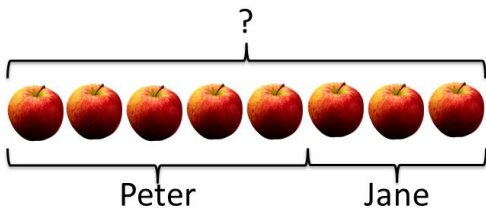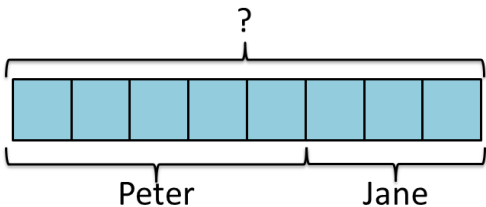
?

Peter   Jane

Calculations

5 + 3 = ?

Model (Version 2)

?

Peter   Jane

Calculations

5 + 3 = ?

Model (Version 2)

?

Peter   Jane

Calculations

5 + 3 = ?

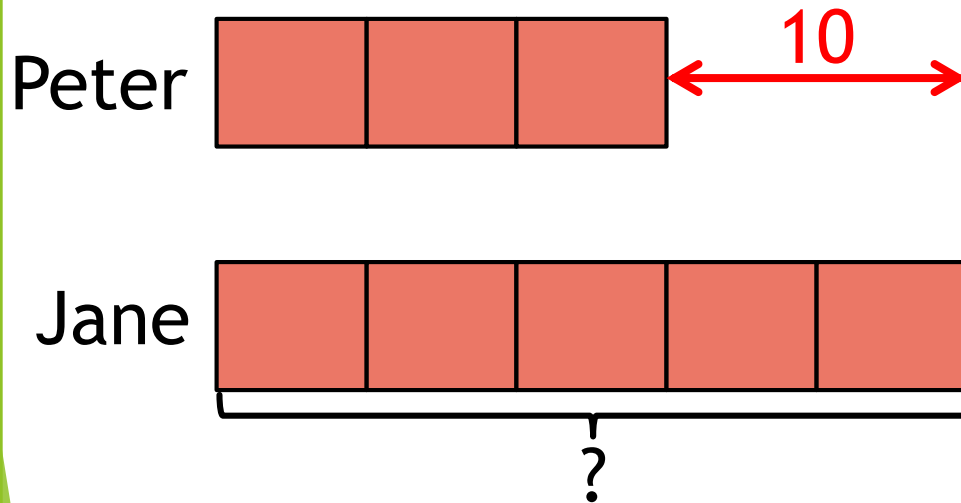Model (Version 3)

?

| 5 | 3 |

Peter   Jane
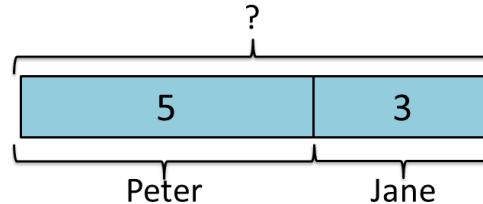
Calculations

5 + 3 = ?

5 + 3 = ?

Ratio

Peter and Jane share some money in the ratio of 3:5
Peter gets £10 less than Jane. How much did Jane get?

Model

Peter

10

Jane

?

How Can They Be Used to Solve Problems?

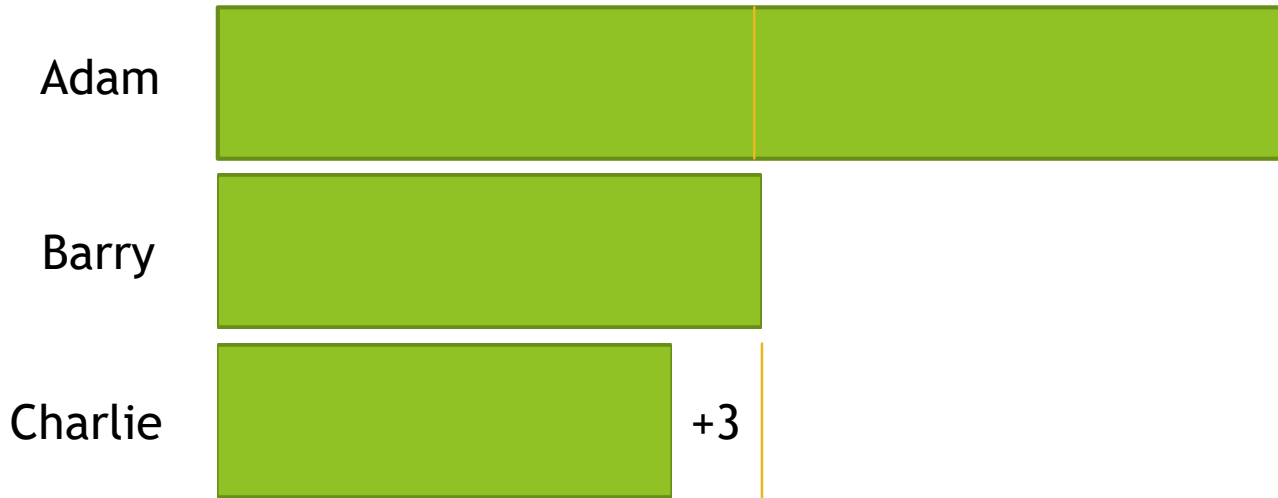*Adam, Barry and Charlie are brothers.*

Adam is twice as old as Barry.

Charlie is 3 years younger than Barry.

The sum of all their ages is 53.

How old is Barry?

Bar models can be used as a problem solving tool.

Adam

Barry

Charlie   +3

53 +3
56 divided by 4 equal parts=14
Adam 2 x14
Barry 1x14
Charlie 1x14-3= 11

How can you support your child at home?

- Talking mathematically – maths is all around you!
- Games, counting rhymes, songs
- Learning number bonds and multiplication tables
- Telling the time
- Cooking – measures
- Support your pupils in learning multiplication/division tables
- Cutting out/folding shapes – developing spatial awareness and fine motor skills

Maths Passports

To support Fluency we are reintroducing maths passports.

6. North America

1. Europe

2. Asia

3.1. Africa

7. South America

4. Australasia

3.2 South Africa

5. Antartica

3.2. South Africa

S. AFRICA	Date Achieved	Date Achieved	Date Achieved
Know by heart all bonds of multiples of 10 to 100			
Know by heart doubles and halves of all numbers to 20			
Count in tens from any number, forward or backward			
Know by heart addition and subtraction facts for each number up to 20			
Know by heart all multiplication facts, and division facts, for 2, up to 2 x 12			
Know by heart all multiplication facts, and division facts, for 5, up to 5 x 12			
Know by heart all multiplication facts, and division facts, for 10, up to 10 x 12			

Maths Passports

Multiplication and Division Facts for 3x

Left	South Africa	Right
	4x5	
	25÷5	
	6x5	
	20÷5	
	9x5	
	2x5	
	15÷5	
	5x5	
	8x5	
	60÷5	

Left	South Africa	Right
	5x5	
	35÷5	
	2x5	
	45÷5	
	6x5	
	12x5	
	55÷5	
	9x5	
	30÷5	
	4x5	

Left	South Africa	Right
	10x5	
	40÷5	
	5x5	
	9x5	
	25÷5	
	10÷5	
	11x5	
	7x5	
	2x5	
	5÷5	

Left	South Africa	Right
	5x5	
	15÷5	
	9x5	
	60÷5	
	30÷5	
	2x5	
	12x5	
	15÷5	
	4x5	
	50÷5	

Maths passports.
Learning at home to support your child's fluency.

- Practise, in order, out of order and divide….

- In the car, in the bath, when you are out walking etc

- Complete the practise sheets to ensure that the learning is embedded.

- Record in passport that your child has completed 3 of the tests successfully (approx. 5 seconds per answer)

- The teacher will confirm this with a test in school.

- The teacher will send the next task practise sheets home.

- Repeat

Progression

Does not necessarily apply to year groups, though there will be individual targets.

- **Europe and Asia**
- **Africa and South Africa**
- **Australasia and Antarctica**
- **North America and South America** (Multiplication check Year 4)
- **Globe Trotters and Milky Way**

Maths calculation policy...

▶ https://www.northstainley.n-yorks.sch.uk/MAP.aspx?pid=Curriculum_en-GB&aid=nn_342617705_266422433

▶ Please find the maths calculation policy with clear examples on our curriculum page on the website.

▶ This will support fidelity in the methods used in school and at home.

▶ This supports all 4 operations and shows progression as your child moves through the school.