Melbourne Infant School

Meeting for parents - Maths
October 2018

National Centre
for Excellence in the
Teaching of Mathematics

The Essence of Maths Teaching for Mastery

- Maths teaching for mastery rejects the idea that a large proportion of people 'just can't do maths'.

- All pupils are encouraged by the belief that by working hard at maths they can succeed.

- Pupils are taught through whole-class interactive teaching, where the focus is on **all** pupils working together on the same lesson content at the same time, as happens in Shanghai and several other regions that teach maths successfully. This ensures that all can master concepts before moving to the next part of the curriculum sequence, allowing no pupil to be left behind.

- If a pupil fails to grasp a concept or procedure, this is identified quickly and early intervention ensures the pupil is ready to move forward with the whole class in the next lesson.

- Lesson design identifies the new mathematics that is to be taught, the key points, the difficult points and a carefully sequenced journey through the learning. In a typical lesson pupils sit facing the teacher and the teacher leads back and forth interaction, including questioning, short tasks, explanation, demonstration, and discussion.

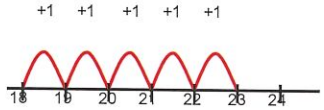
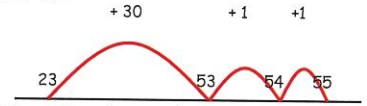
- Procedural fluency and conceptual understanding are developed in tandem because each supports the development of the other.

- It is recognised that practice is a vital part of learning, but the practice used is **intelligent practice** that both reinforces pupils' procedural fluency and develops their conceptual understanding.

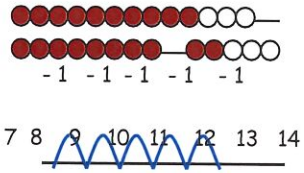
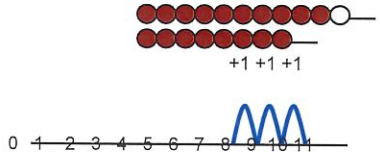
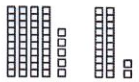
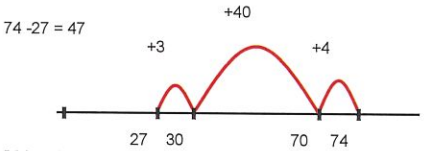
- Significant time is spent developing deep knowledge of the key ideas that are needed to underpin future learning. The structure and connections within the mathematics are emphasised, so that pupils develop deep learning that can be sustained.

- Key facts such as multiplication tables and addition facts within 10 are learnt to automaticity to avoid cognitive overload in the working memory and enable pupils to focus on new concepts.

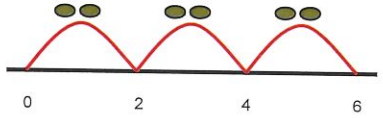
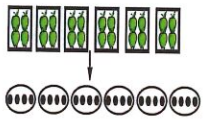
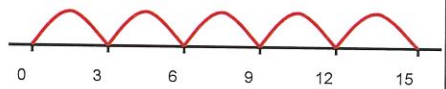
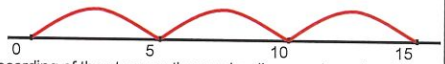
Calculation Policy—Addition

Year Group	Age related expectations	Rapid Recall	Mental Calculations	Concrete → Abstract → Symbol
EYFS	Addition as combining 2 groups Use vocabulary involved in adding 1 digit + 1 digit	1 more (up to 20)	Add 2 single digit numbers	**Combining groups of objects.** I have 3 balls and my friend has 4 balls. How many balls are there altogether?  **Symbols** 8 people are on the bus. 5 more get on at the next stop. How many people are on the bus now?  May be record as 3 + 4 = 7  **Numicon** used to combine pieces together (children could record this by printing or drawing around Numicon)  **Number tracks/lines** can be introduced to count up on and find one more 
Year 1	Pupils should be taught to: read, write & interpret mathematical statements involving addition (+), & equals (=) signs · Add one-digit & two-digit numbers to 20, including zero. · Solve one-step problems that involve addition using concrete objects & pictorial representations, and missing number problems such as 7 = [ ] - 9.	Number bonds to 20 1 or 10 more than a number up to 100	1 digit + multiple of 10 2 digit and multiple of 10 + 9 (by + 10 - 1)	**Combining two groups** As above and **Cuisenaire Rods** 23 + 10 =  **Straws**  **Number tracks** Jumping in 1s along the number line. 18 + 5 = 23  Jumping in 1s on the 100 square **Equality** Children need to understand the concept of equality before using the = sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as the answer. 2 = 1 + 1 2 + 3 = 4 + 1 **Missing Numbers** Need to be placed in all possible places. 3 + 4 = [] [] = 3 + 4 3 + [] = 7 7 = [] + 4
Year 2	Add numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones a two-digit number and tens two two-digit numbers adding three one-digit numbers Show that addition of two numbers can be done in any order. · Recognise and use the inverse relationship between addition & subtraction and use this to check calculations and missing number problems.	Addition facts to 20. Pairs to 100 (using multiples of 10) e.g. 20/80.	Two-digit number and ones two-digit number and tens two two-digit numbers adding three one-digit numbers	**Combining two groups** As above and **Cuisenaire Rods** 23 + 12 =  **Straws**  Number lines, 100 squares, blank number lines. 23 + 32 =  Also moving onto recording as 23 + 32 = 20 + 30 = 50 3 + 2 = 5 50 + 5 = 55 **Equality** Children need to understand the concept of equality before using the = sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as the answer. 2 = 1 + 1 2 + 3 = 4 + 1 **Missing Numbers** Need to be placed in all possible places. 3 + 4 = [] [] = 3 + 4 3 + [] = 7 7 = [] + 4

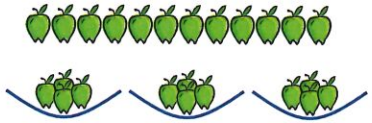
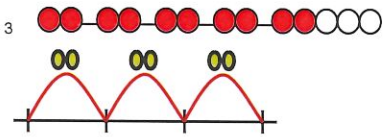
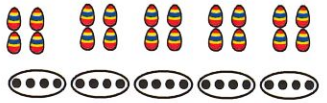
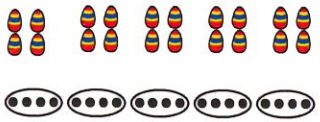
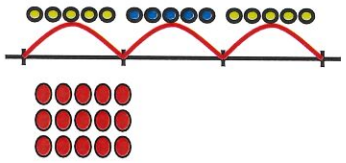
Calculation Policy – Subtraction

Year Group	Age related expectations	Rapid Re-call	Mental Cal-culations	Concrete → Abstract → Symbol
EYFS	Find 1 less than a number (up to 20) Subtraction as 'taking away' from a group 1 digit – 1 digit	1 less (nos. up to 20)		**Pictures/ Objects** I have five cakes. I eat two of them. How many do I have left?  Might be recorded as: *5 – 2 = 3* Mum baked 9 biscuits. I ate 5. How many were left?  Using the Numicon to cover over holes.  Might be recorded as: *9 – 5 = 4*
Year 1	Subtraction as 'taking away' and 'difference' (by counting on) Subtract 1 digit + 2 digit numbers to 20 including zero	Subtraction facts to 10 1 or 10 less than a number	Subtract 1 digit numbers from 20	**Pictures/ Objects** I have five cakes. I eat two of them. How many do I have left?  **Taking away** – jumps of 1 (modelled using bead strings) 13 – 5 =8  **Taking away by counting on** (finding the difference) 11 – 8 = 3 
Year 2	Subtraction as inverse of addition Subtract numbers including 2 digit no and 1's, 2 digit no and tens, two 2 digit nos.	Subtraction facts to at least 20 and use related fact up to 100	Difference by counting up Subtract 1's or tens from a 2 digit numbers Subtract two 2 digit numbers eg 36-18	**Cuisenaire Rods** 45 – 22 = 23  Children need to understand the exchange rule if not enough units. If children are not ready for using blank number lines for finding the difference use partitioning method. 45 - 20 = 25 **Number lines – counting on**  [Also jumps can be in 10s and 1s] **(rounding to the nearest 10 needs to be embedded)** **Partitioning** 74 - 27 74 – 20 = 54 54 – 4 = 50 50 – 3 = 47

Calculation Policy — Multiplication

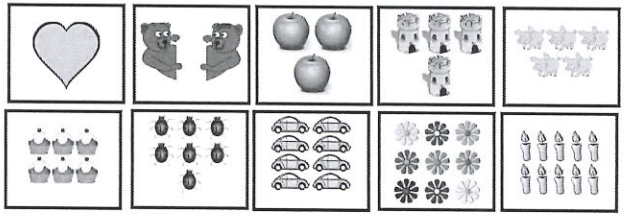
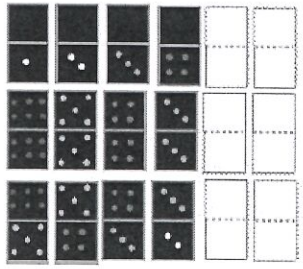
Year Group	Age related expectations	Rapid Recall	Mental Calculations	Concrete → Abstract → Symbol
EYFS	Solve (practical) problems that involve doubling.	NA	No recording	3 plates, 2 cakes on each plate:  3 plates, 2 cakes on each plate: 
Year 1	Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations	Count on / back in 1s, 2s, 5s and 10s Doubles of numbers to 10	No recording	There are three sweets in one bag. How many sweets are there in five bags?  **2** x 3 **or** 3 x **2** [wo, three times] or [three groups of two]  Arrays 5 x 3 or 3 x 5   0 2 4 6 Children start by understanding multiplication as arrays and repeated addition. They use this understanding to help them work out multiplication facts they cannot recall quickly
Year 2	· Recall & use multiplication facts for 2, 3, 5 & 10 tables, including recognising odd and even numbers · Calculate mathematical statements for multiplication within the multiplication tables; write them using multiplication (x) & equals (=) signs. · Show that multiplication of two numbers can be done in any order (commutative) · Solve problems involving multiplication using materials, arrays, repeated addition, mental methods, and multiplication including problems in contexts.	Multiplication facts for the 2, 5 and 10 x tables. Doubles of numbers to 20	Solve problems involving the 2,5 and 10 times table.	There are four apples in each box. How many apples in six boxes  **Arrays** 5 x 3 or 3 x 5  Children start by understanding multiplication as arrays and repeated addition. They use this understanding to help them work out multiplication facts they cannot recall quickly **Repeated addition** 5 x 3 or 3 x 5  0 3 6 9 12 15  0 5 10 15 Recording of the steps on the number line may be refined as understanding and knowledge of facts develops

Calculation Policy – Division

Year Group	Age related expectations	Rapid Re-call	Mental Cal-culations	Concrete → Abstract → Symbol
EYFS	Solve problems (practically) by sharing and halving.		No recording	**Pictures / Objects** 6 cakes shared between 2  6 cakes put into groups of 2  **Symbols** 6 cakes shared between 2  6 cakes put into groups of 2 
Year 1	· Solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations	Derive / recall halves of even numbers to 20	No recording	*Division as sharing small quantities and finding simple fractions of objects, number and quantities.* **Pictures / Symbols** How many apples in each bowl if I share 12 apples between 3 bowls?  **Number tracks / Number line** (using repeated addition) 8 ÷ 2 = 4 6 ÷ 2 = 3  **0Pictures / Symbols** Four eggs fit in a box. How many boxes would you need to pack 20 eggs? 
Year 2	· Recall & use division facts for 2, 5 & 10 tables, including recognising odd and even numbers · Calculate mathematical statements for division within the multiplication tables; write them using division (÷) & equals (=) signs. · Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. · Solve problems involving division, using materials, repeated addition, mental methods, and division facts, including problems in contexts.	Derive / recall ÷ facts for 2, 5 and 10 tables Derive / recall halves of even numbers to 40	Solve problems involving division facts for the 2,5 and 10 times table.	*Division as sharing small quantities and finding simple fractions of objects, number and quantities.* **Pictures / Symbols** Four eggs fit in a box. How many boxes would you need to pack 20 eggs?  **Number lines (repeated addition) / Arrays** 15 ÷ 5 

Term by Term Objectives

Reception

ELG	Objective	All students Example tasks
Numbers **Children count reliably with numbers from 1 to 20, place them order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.**	Counts objects to 10, and beginning to count beyond 10.	• Mix up cards with different objects on from 1 object to 10 objects. *Can you arrange them from smallest to largest? Largest to smallest? Find one less than 7? How do you know you have 6? Can you show me 6 another way?*  • Dinosaur hunt! *Can you find the group of 8 dinosaurs?* Ask children to bring the different groups to the carpet and order them. *How many different ways can you order them?* • Play a game of dominoes. To extend: *What comes next in each of these sequences?*  • Sing: 1,2,3,4,5 once I caught a fish alive with images of fish. 5 currant buns in a bakers shop with images of buns. • In construction area set a challenge to create different structures using exactly 20 bricks.

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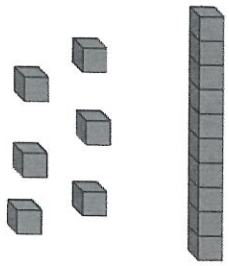
MathsHUBS White Rose

Count Objects to 100

Reasoning and Problem Solving

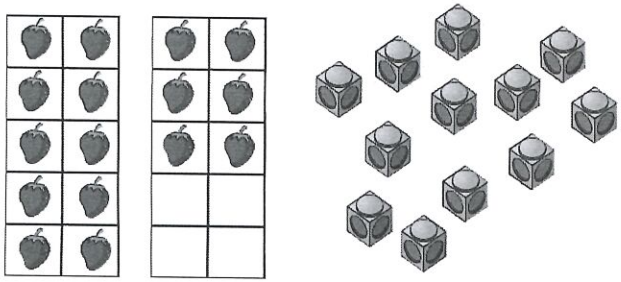
Jack says he has 61
Is he correct?



Explain your reasoning.

Jack is incorrect.
He has 16 not 61

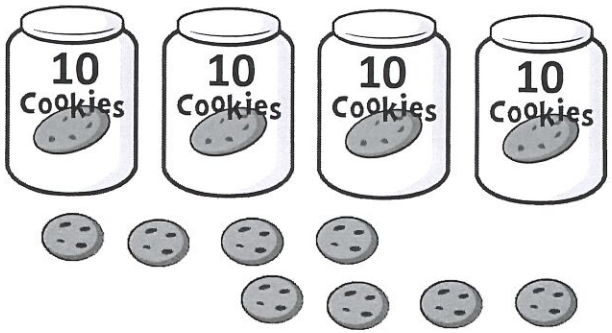
Here are two sets of objects.



Which are easier to count?
Explain your answer.

The strawberries are easier to count because they are set out on ten frames.

Each jar contains 10 cookies.



How many cookies are there altogether?

Write your answer in numerals and words.

What strategy did you use?

Did your partner use a different method?

What is the best strategy to use?

There are 48 (forty-eight) cookies altogether.

Children may count in 10s and 1s or know that there are 4 tens which are equal to 40 and then count on 8 more.