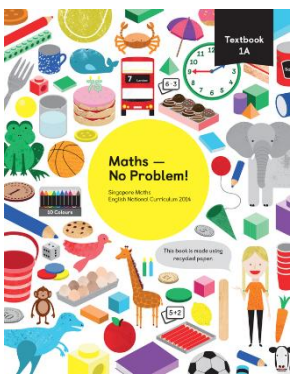
St Joseph's Calculation Policy for families

Year 1



Dear parents,

This Calculation Policy sets out the methods used in school to help your children with calculations. It has been written to meet the requirements of the National Curriculum 2014, and gives pupils a consistent and smooth progression of learning in calculations across the school. It works alongside the highly effective Singapore style of teaching from the scheme **Maths No Problem!**

Children are taught strategies to develop and strengthen their mental agility daily. They also need to be able to apply written calculation skills in order to:

- represent work that has been done practically
- support, record and explain mental calculations
- keep track of steps in a longer task
- work out calculations that are too difficult to do mentally

This policy shows methods that pupils will be taught within their respective year group, in the order they are taught. Children will be encouraged to develop their confidence in choosing and using a strategy that they know will get them to the correct answer as efficiently as possible.

Concrete, Pictorial, Abstract (CPA):

A key principle behind the Singaporean methods used in Maths No Problem! is the concrete, visual and abstract approach. Children are firstly introduced to an idea or skill by acting it out with real, **concrete** objects (a hands – on approach). They then move onto the **pictorial** (visual) stage, where they relate the concrete understanding to visual representations. The final **abstract** stage is a chance for them to represent problems by using mathematical calculations. The CPA approach is used continuously in all new learning and calculations throughout the school.

I hope the progression of skills you see in this booklet helps you when supporting your child at home.

Mrs. Corr

Maths Lead

Year 1 Addition

Addition in Year 1 includes:

- reading, writing and interpreting mathematical statements involving addition (+) and equals (=) signs
- represent and use number bonds within 20
- adding one-digit and two-digit numbers to 20, including zero
- solve one-step addition problems using concrete objects and pictorial representations, and missing number problems.

Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.

Pupils combine and increase numbers, counting forwards and backwards.

They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.

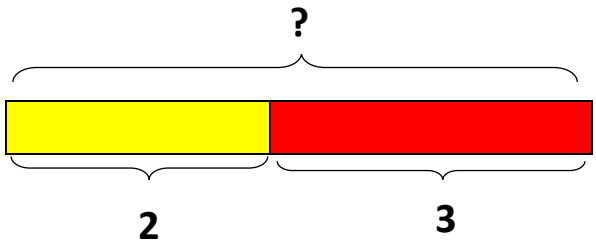
Key vocabulary:

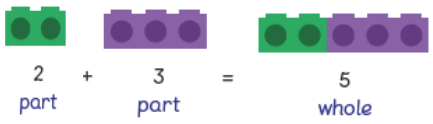
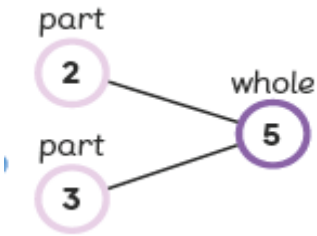
sum, total, parts and wholes, plus, add, altogether, more, is equal to, is the same as, addition, equation, put together, total

Addition by using number bonds problem:

How many swans are there altogether?
How can we find out?

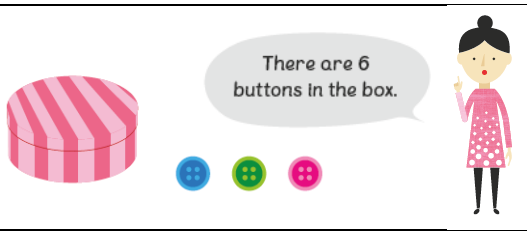
When solving an addition problem pupils are encouraged to draw a bar model like this to help them to understand the problem. They are taught that when they add they are given the 2 'parts' and are expected to find the 'whole'



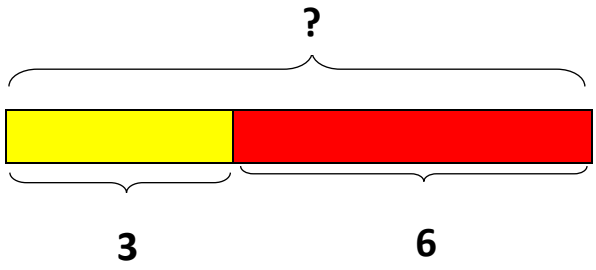
Concrete	Pictorial	Abstract
	**Part-whole model** 	**Addition equation** $2 + 3 = 5$
An addition word problem is focussed on. Concrete materials are used to represent the swans, such as cubes or counters.	Pupils go on to make a number bond diagram. The part whole model shows how the 2 parts are combined, added together to create the whole set.	The link between the image of the swans and the cubes is made with the calcuation. They are introduced to the addition and equals symbols. They are taught that this is an **addition equation.** It is read **'two plus three equals five'**

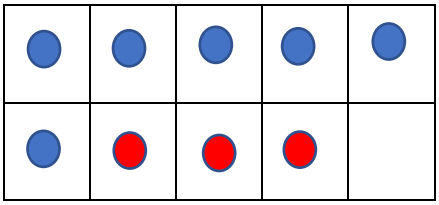
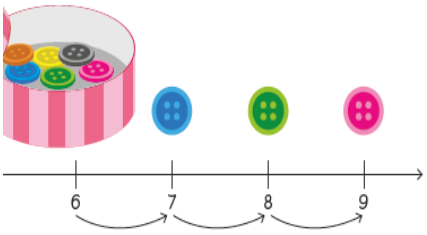
Addition by counting on problem:

How many buttons are there in total?



When solving an addition problem pupils are encouraged to draw a bar model like this to help them to understand the problem. They are taught that when they add they are given the 2 'parts' and are expected to find the 'whole'

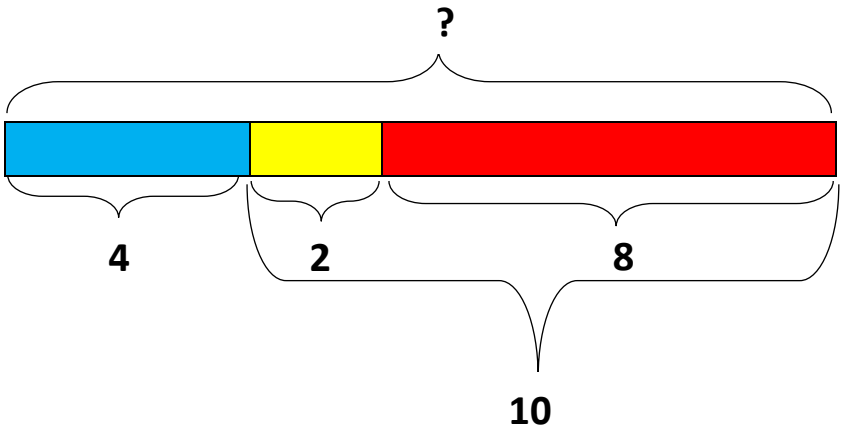


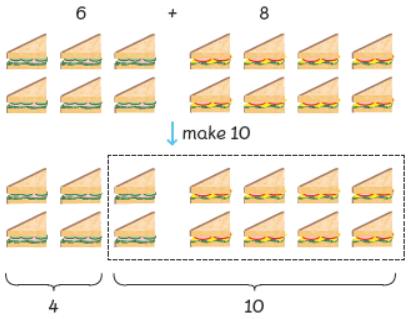
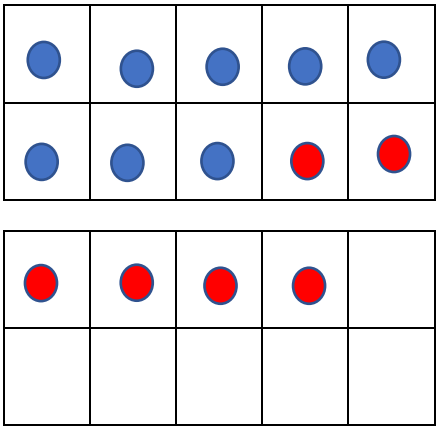
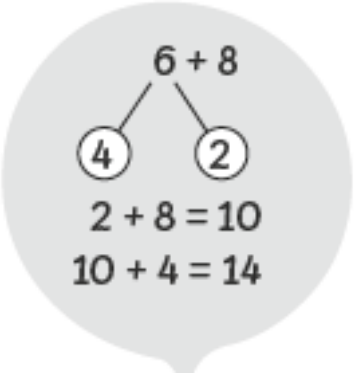
Concrete	Pictorial	Abstract
	**Number line** 	**Addition equation** 6 + 3 = 9 There are 9 buttons in total.
An addition word problem is focussed on. Concrete materials are used to explore the problem. Cubes, counters and 10 frames can be used to represent the buttons.	The pupils are encouraged to put the larger number (6) in their head, and use a number line to count on 3 more.	The calculation is represented with an addition equation.

Addition by making 10 problem:

How many sandwiches are there?

When solving an addition problem children are encouraged to draw a bar model like this to help them to understand the problem. They are taught that when they add they are given the 2 'parts' and are expected to find the 'whole'



Concrete	Pictorial	Abstract
 **Use number bonds to make 10:** 	**Part whole model** 	**Addition equation** 6 + 8 = 14 There are 14 sandwiches.

An addition word problem is focussed on. Concrete materials are used to explore the problem. Here, counters and 10 frames help to secure the use of number bonds. The pupils are encouraged to make 10, using their understanding of number bonds, and count on.	The part-whole model shows how 6 is partitioned into 4 and 2. The number bond 10 is made by adding 2 ones (from the 6) with the larger number 8 ones to make 10. The remaining 4ones (from the 6) are added on to make 14.	The calculation is represented with an addition equation.

Year 1 Subtraction

Subtraction in Year 1 includes:

- reading, writing and interpreting mathematical statements involving subtraction (-) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- subtracting one-digit and two-digit numbers to 20, including zero
- solve one-step subtraction problems using concrete objects and pictorial representations, and missing number problems.

Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.

Pupils combine and increase numbers, counting forwards and backwards.

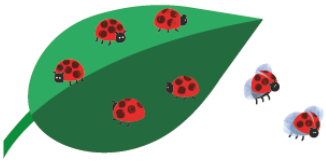
They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.

Key language:

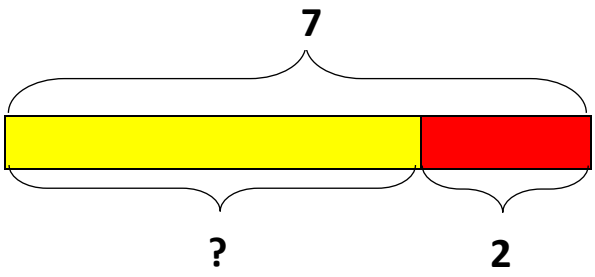
take away, subtract, count back, less than, difference between, subtract, minus, fewer, is equal to, distance between, less than

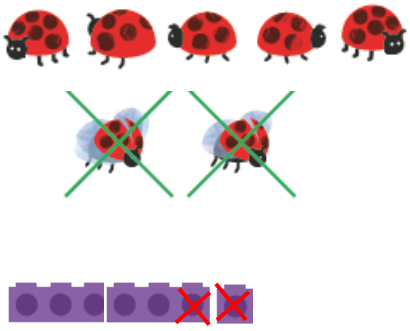
Subtraction by crossing out problem:

How many ladybirds are still on the leaf?



When solving a subtraction problem like this, pupils are encouraged to draw a bar model to help them to understand what is being asked of them before solving the calculation. They are taught that when they are given the 'whole' and a 'part' then they must perform a subtraction to find the other 'part'.

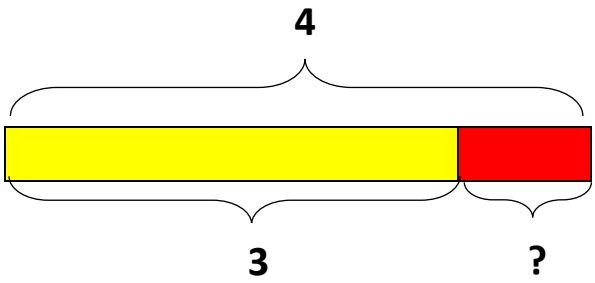


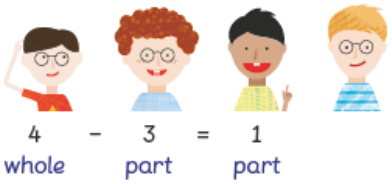
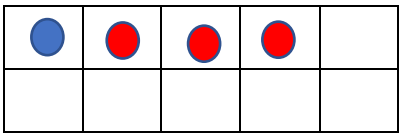
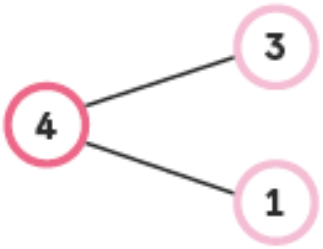
Concrete	Pictorial	Abstract
		**Subtraction equation** 7 – 2 = 5 5 ladybirds are left.
A subtraction word problem is focussed on. Concrete materials are used to explore the problem. Talk through the story and cross out the ladybirds to represent subtraction. The pupils can then use concrete materials, such as counters or cubes, to represent the problem.	Here a number line with digits is used to represent the total number of ladybirds, and subtraction is represented by crossing off.	The modelling is represented with digits and read: '**seven minus two equals five**'

Subtract by using number bonds problem:

How many boys wear glasses?

When solving a subtraction problem like this, pupils are encouraged to draw a bar model to help them to understand what is being asked of them before solving the calculation. They are taught that when they are given the 'whole' and a 'part' then they must perform a subtraction to find the other 'part'.

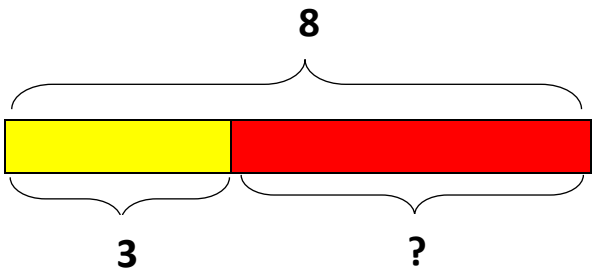


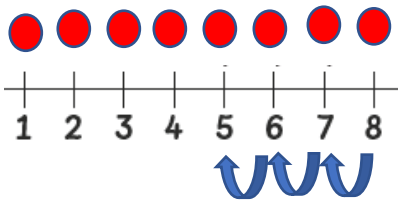
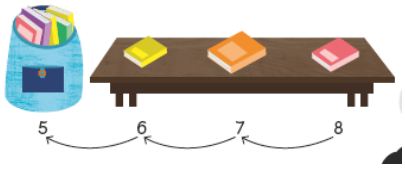
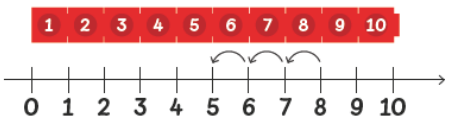
Concrete	Pictorial	Abstract
There are four boys, three wear glasses.  4 whole − 3 part = 1 part **Counters** 	**Part whole model**  4 3 1	**Subtraction equation** **4 − 3 = 1** 1 boy does not wear glasses.
A subtraction word problem is focussed on. Concrete materials are used to explore the problem. The story is talked through and the pupils are shown which is the 'whole' and 'part'. Number bonds are used to show what is needed to represent what the other part is. Double sided counters are used to show the two parts.	A part whole model is used to show how the whole set is partitioned, and what is left.	The modelling is represented with digits and read: '**four minus three equals one**'

Subtraction by counting back problem:

How many books are there in the bag?

When solving a subtraction problem like this, pupils are encouraged to draw a bar model to help them to understand what is being asked of them before solving the calculation. They are taught that when they are given the 'whole' and a 'part' then they must perform a subtraction to find the other 'part'.

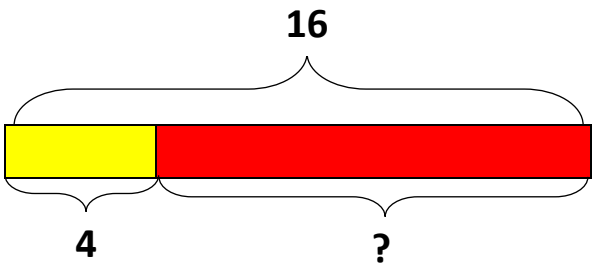


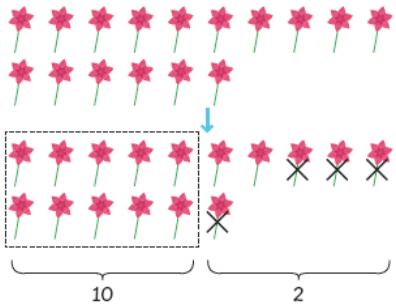
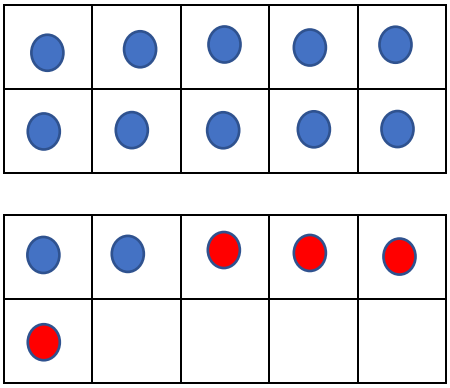
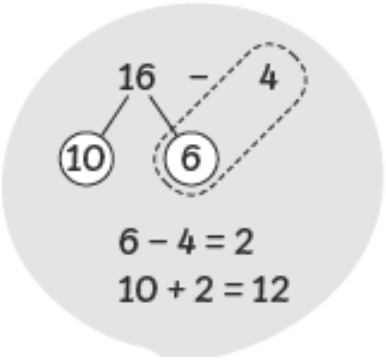
Concrete	Pictorial	Abstract
 	**Number line** 	**Subtraction equation** 8 – 3 = 5 There are 5 books in the bag.
A subtraction word problem is focussed on. Concrete materials are used to explore the problem. Cubes or counters can replace the books, and then the pupil counts back along the number line.	The counters are replced by a numbered number line, and the pupil counts back 3 steps from 8.	The modelling is represented with digits and read: '**eight minus three equals five**'

Subtraction by subtracting ones problem:

4 flowers wither and die.
How many flowers are left?

When solving a subtraction problem like this, pupils are encouraged to draw a bar model to help them to understand what is being asked of them before solving the calculation. They are taught that when they are given the 'whole' and a 'part' then they must perform a subtraction to find the other 'part'.



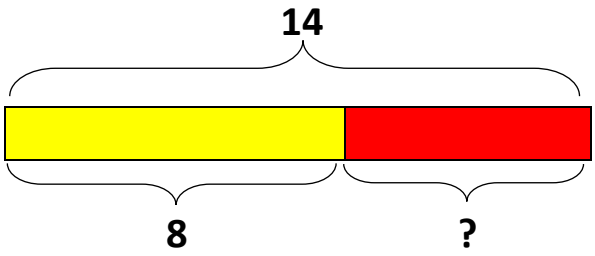
Concrete	Pictorial	Abstract
Partitioning into tens and ones to subtract the Ones:  **Using a 10 frame and counters:** 	**Part whole model**  	**Subtraction equation** 16 – 4 = 12 There are 12 flowers left.

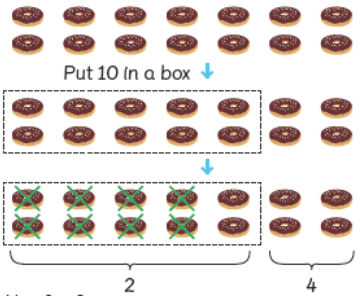
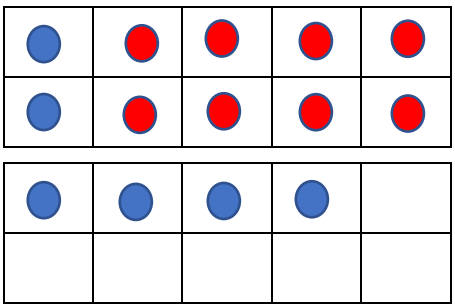
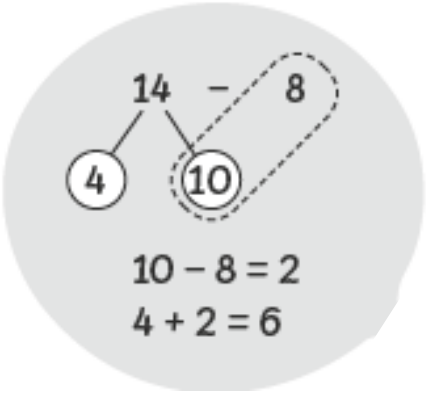
A subtraction word problem is focussed on. Concrete materials are used to explore the problem. The 10 frame and double sided counters here, show how 4ones are subtracted from the 6ones, and then recombine the tens and remaining ones.	Pupils partition the set into 1ten and 6ones. From the ones they subtract 4, then recombine the remaining tens and ones to equal 12.	The modelling is represented with digits and read: '**sixteen minus four equals twelve'**

Subtraction from 10 problem:

How many doughnuts does Sam have left?

When solving a subtraction problem like this, pupils are encouraged to draw a bar model to help them to understand what is being asked of them before solving the calculation. They are taught that when they are given the 'whole' and a 'part' then they must perform a subtraction to find the other 'part'.



Concrete	Pictorial	Abstract
Partitioning into tens and ones to subtract from the Tens  **10 frame** 	**Part-whole model** 	**Subtraction equation** 14 – 8 = 6 Sam has 6 doughnuts left.
A subtraction word problem is focussed on. Concrete materials are used to explore the problem.	A part-whole model is used to replace the counters with digits when partitioning and subtracting.	The modelling is represented with digits and read: '**fourteen minus eight equals six**'

The pupils use counters and a 10 frame explore to see where is best to subtract 8 from – the tens or ones. Here it is best to subtract from the ten. They use their understanding of number bonds and subtract 8ones from the ten which will give them 2 ones. They combine by adding 2 ones with the 4 ones.		

Year 1 Multiplication

Multiplication in Year 1 includes:

- solving one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. Problems include making and adding equal groups.

Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.

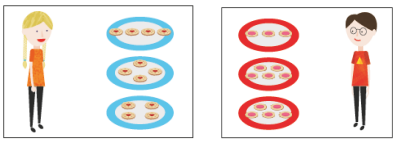
They make connections between arrays, number patterns, and counting in twos, fives and tens.

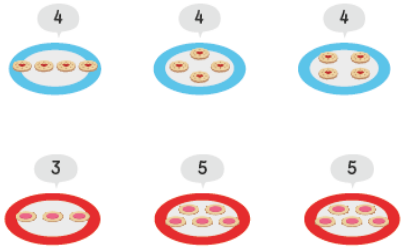
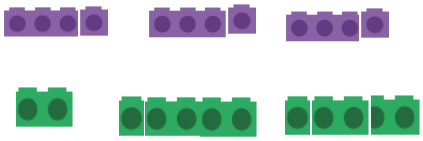
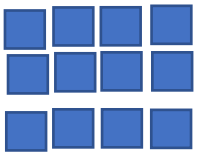
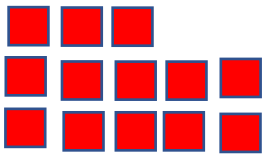
Key language:

double, times, groups of, lots of, equal groups.

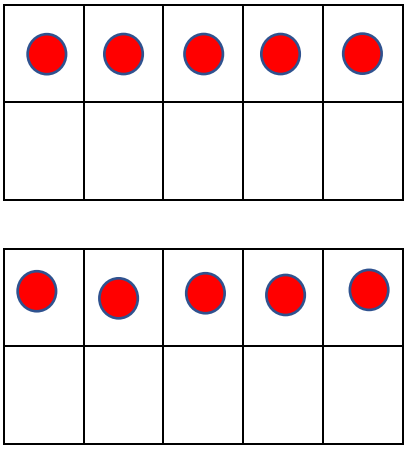
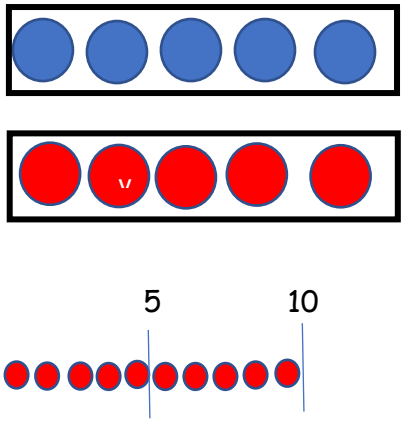
Multiplication by making equal groups problem:

Who made equal groups?



Concrete	Pictorial	Abstract
 **Cubes** 	**Drawing groups**  	Each plate has 4. These are equal groups. **There are 3 groups. Each group has 4 cookies. Each group is equal.** These are not equal groups.
A multiplication word problem is focussed on. Concrete materials are used to explore the problem. The pupils use counters or cubes and paper to represent the cookies and plates. They place the counters on and count or subitise (see) if each group is equal.	The pupils draw representations for the cookies. They compare the rows which represent the plates.	They make a statement to explain how many groups and how many are in each equal group. Using the correct language is very important, as it helps their understanding and when explaining.

Multiplication by adding equal groups problem

Concrete	Pictorial	Abstract
10 frame 	**Counting and drawing sets of 5s**  	**There are 2 trays of 5 drinks.** **2 trays of 5 = 10** **2 groups of 5 = 10** **2 fives = 10** **There are 10 drinks altogether.**
A multiplication word problem is focussed on. Concrete materials are used to explore the problem. The pupils use counters and paper or a 10 frame to represent the drinks and trays. They count or subitise (see) to check how many are in each group and if each group is equal. They start to count in 5s.	Pupils make representations to show how they count in multiples of 5.	The pupils make a statement to explain how many groups there are and how many are in each group. They make the links between **2 trays, 2 groups and 2 fives.**

Year 1 Division

Division in Year 1 includes:

- solving one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. Problems include grouping and sharing equally.

Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.

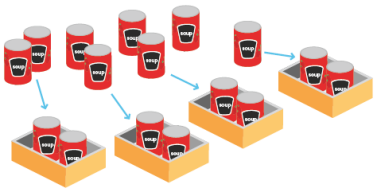
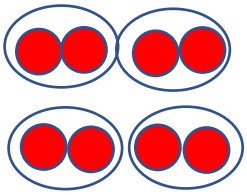
They make connections between arrays, number patterns, and counting in twos, fives and tens.

Key language:

share, group, divide, equal groups, half.

Division by grouping equally problem:

Emma puts 2 cans of tomato soup into a box.
How many boxes does she need for all the cans?

Concrete	Pictorial	Abstract
Grouping cans into 2s:  **Counters:** 	**Drawing groups** 	**There are 8 cans.** **There are 4 boxes of 2 cans.**
A division word problem is focussed on. Concrete materials are used to explore the problem. The cans are physically shared out and grouped into 2s. Cubes or counters on paper, plates or in groups then represent the cans and boxes. The pupils then count/see how many groups/boxes are needed.	Pupils use pictures or shape to represent quantities. They represent grouping by drawing a circle around each set.	The pupils make a statement to explain how many cans there are to share, and how many are grouped into each box.

Division by sharing equally problem:

There are 6 cookies.
Each child takes the same number of cookies.
How many cookies does each child get?

Concrete	Pictorial	Abstract
Sharing cookies between 3 children:  **Counters:** 	**Drawing sets** 	**Each child takes one cookie.** **Each child takes one more cookie, until there are no more left.** **Each child has 2 cookies.**
A division word problem is focussed on. Concrete materials are used to explore the problem. The pupils use counters or cubes to explore what is being shared (the cookies), and how many groups they need to make (3 children/ plates).	Pupils use shapes or pictures to represent quantities to share into 3 sets.	The pupils make a statement to explain how many cookies there are to share, and how many are grouped for each child.

What can you do to help at home?

- Be positive
- Talk about maths with your child
- Involve your child in any maths activity (shopping, cooking, DIY) and let your child lead where they can
- Talk about maths in sport
- Look at number puzzles in papers or magazines
- Share strategies and methods used at school (allow your child to be the expert)

A thought to finish:

'Good mathematics is not about how many answers you know – it's how you behave when you don't know'