KS1 Calculation: Parent Workshop

OBJECTIVES

- To understand the multiplication and division strategies taught at Days Lane in KS1.
- To understand the CPA approach of multiplication and division.
- To know how to support your child at home with multiplication and division.

NATIONAL CURRICULUM EXPECTATIONS – YEAR 1

Statutory requirements
Pupils should be taught to: ▪ solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

NATIONAL CURRICULUM EXPECTATIONS – YEAR 2

Statutory requirements
Pupils should be taught to: ▪ recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers ▪ calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and 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 multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

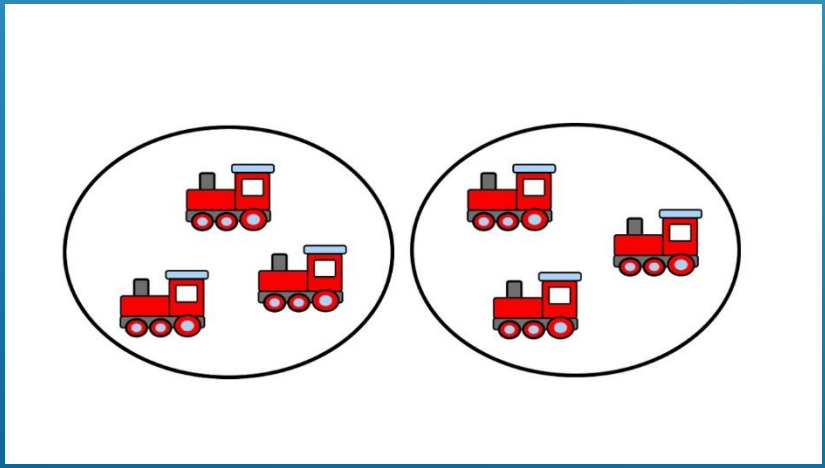
WHAT IS THE CPA APPROACH?

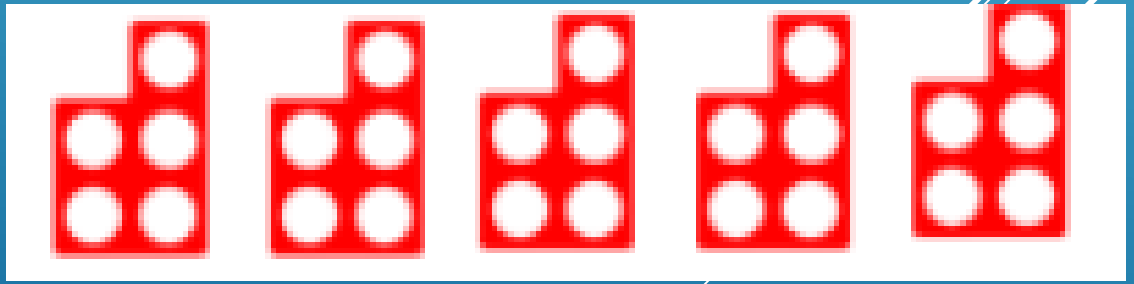
- Concrete, Pictorial, Abstract (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of maths in pupils. Often referred to as the concrete, representational, abstract framework, CPA was developed by American psychologist Jerome Bruner. It is an essential technique within the method of teaching maths for mastery.
- Children often find maths difficult because it is abstract. The CPA approach helps children learn new ideas and build on their existing knowledge by introducing abstract concepts in a more familiar and tangible way.
- The CPA method involves using actual objects for children to add, subtract, multiply or divide. They then progress to using pictorial representations of the object, and ultimately, abstract symbols.

MULTIPLICATION

VOCABULARY - MULTIPLICATION

- We first explain to children that multiplication means 'groups of', 'lots of' or 'columns of'.
- This is how children refer to multiplication in Year 1.
- They do not use the language of 'times' or 'times tables' until Year 2.





CONCRETE

- At Days Lane in KS1 we primarily use numicon as the concrete representation of number.
- Numicon is a maths resource that uses a series of structured images to represent numbers.

numicon

= **num**ber **+ icon**

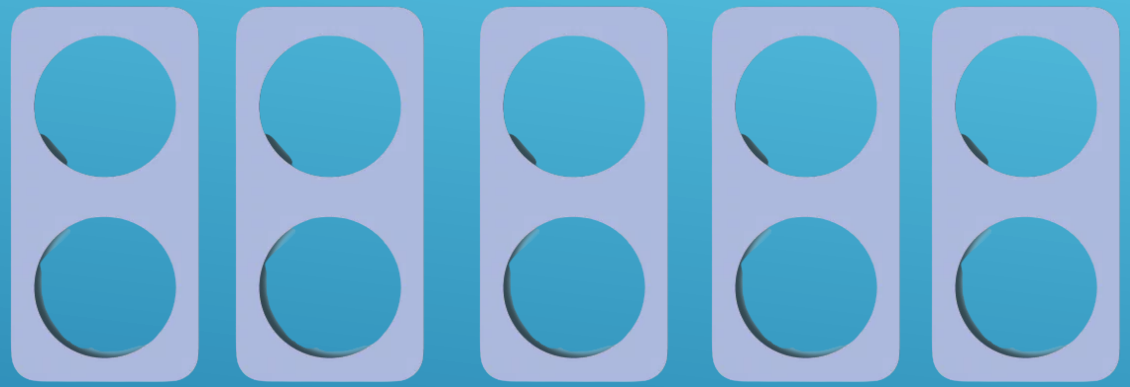
MULTIPLICATION - CONCRETE

5 lots of 2 =

(Year 1)

5 X 2 =

(Year 2)



2 + 2 + 2 + 2 + 2

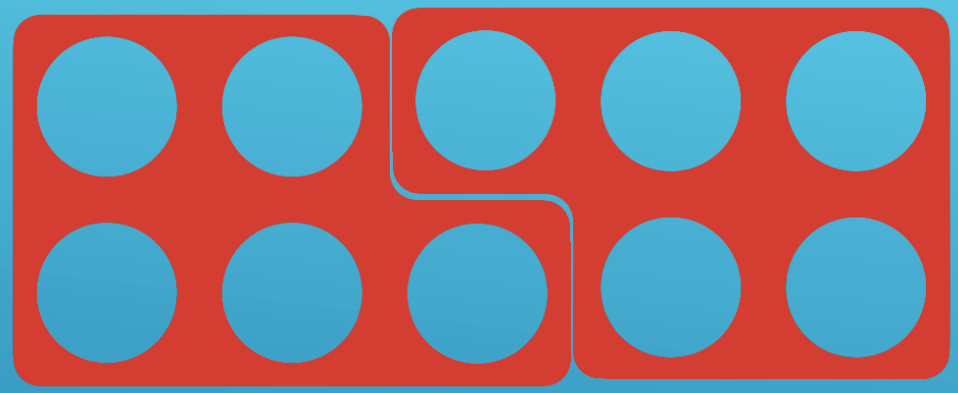
The children are taught that multiplication is repeated addition.

Children count in 2s to solve this.

MULTIPLICATION - CONCRETE

2 groups of 5 =
(Year 1)

2 X 5 =
(Year 2)

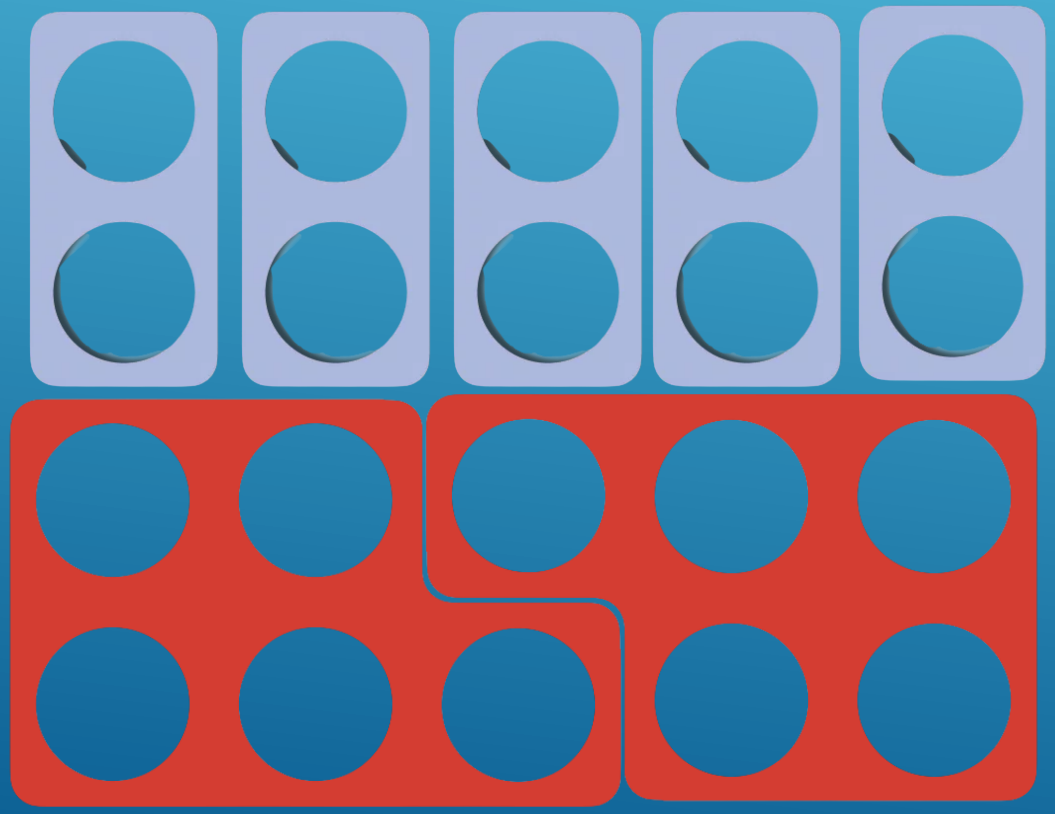


5 + 5

Children count in 5s to solve this.

MULTIPLICATION - CONCRETE

In Year 2 children are taught the commutative law for multiplication.
Numicon demonstrates this to them clearly.

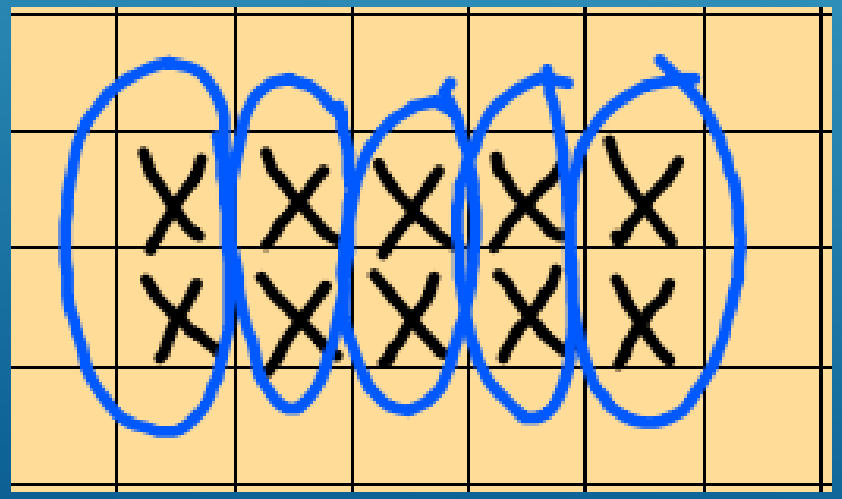


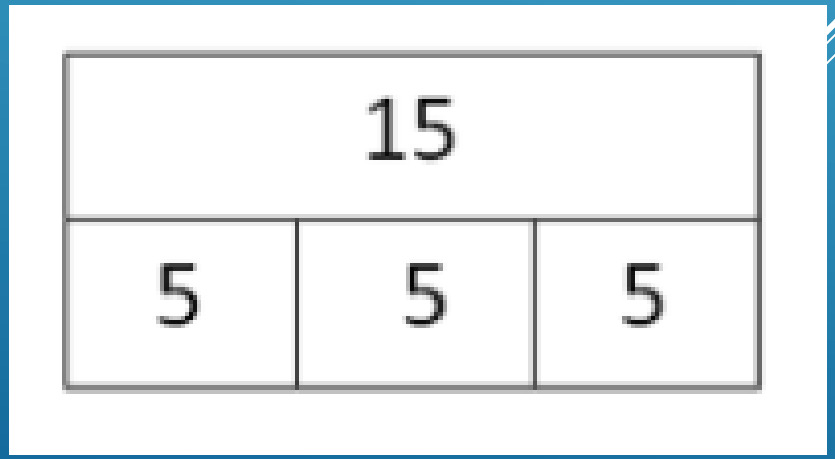
5 X 2 = 10

2 X 5 = 10

PICTORIAL

- Children are taught the pictorial representation of multiplication alongside the concrete.
- We represent multiplication pictorially by drawing arrays or bar models.
- When we draw arrays we use crosses. This is consistent with the children's addition and subtraction learning.



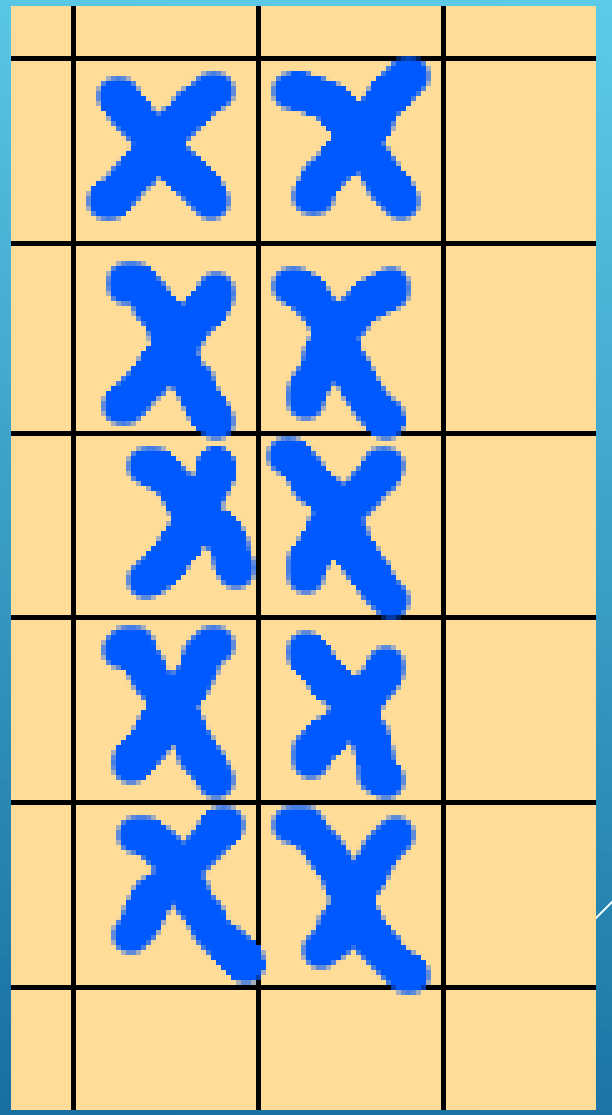


MULTIPLICATION - PICTORIAL

2 groups of 5 =
(Year 1)

2 X 5 =
(Year 2)

We explain to the children that our groups are in columns.
This is 2 columns of 5.
We count in 5s to solve this.



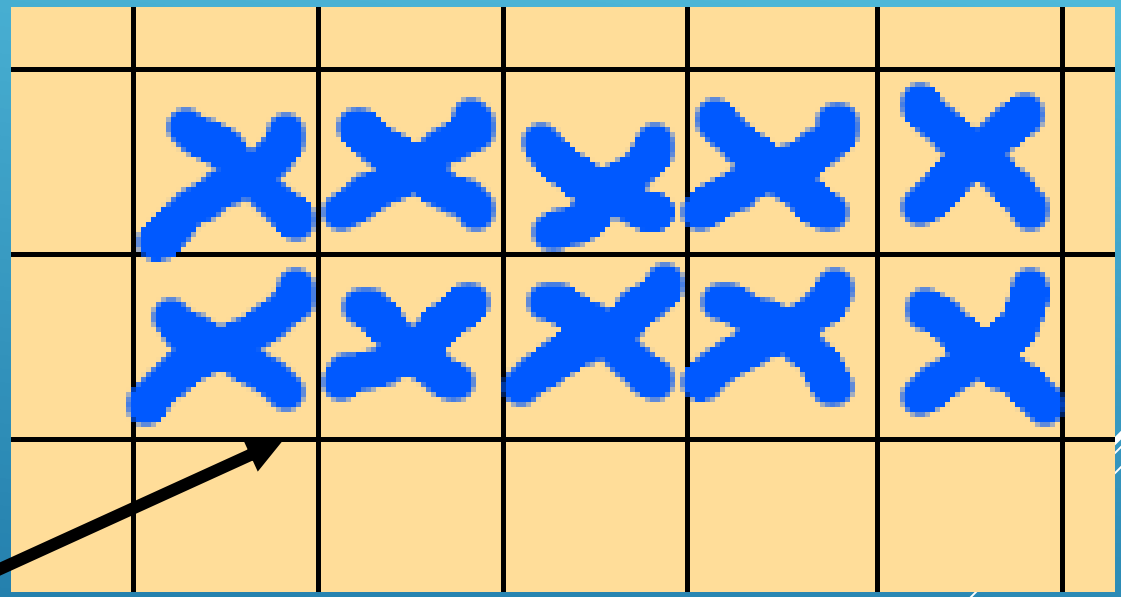
MULTIPLICATION - PICTORIAL

5 groups of 2 =

(Year 1)

5 X 2 =

(Year 2)



We explain to the children that our groups are in columns.
This is 5 columns of 2.
We count in 2s to solve this.

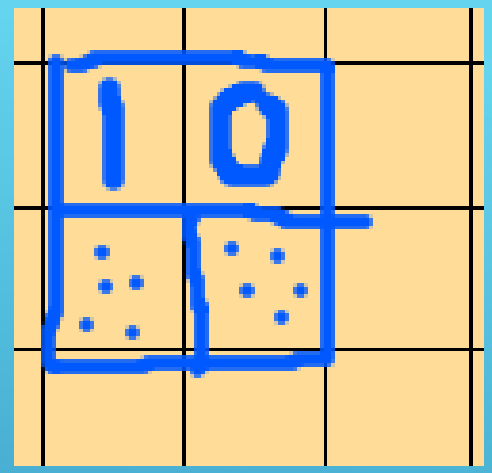
MULTIPLICATION - PICTORIAL

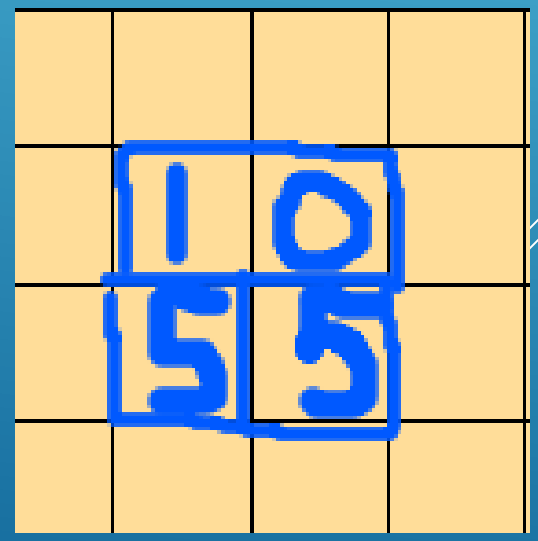
2 lots of 5 =

(Year 1)

2 X 5 =

(Year 2)



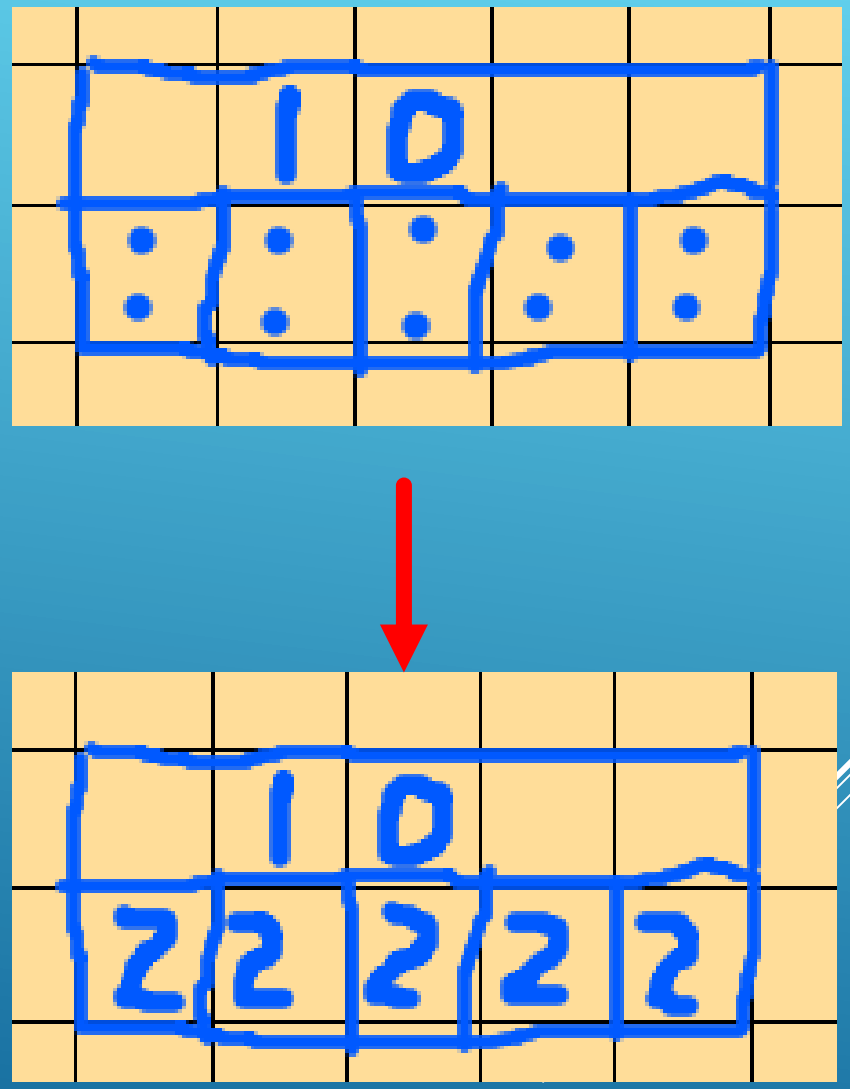


Children would count in 5s to solve this.

MULTIPLICATION - PICTORIAL

5 lots of 2 =
(Year 1)

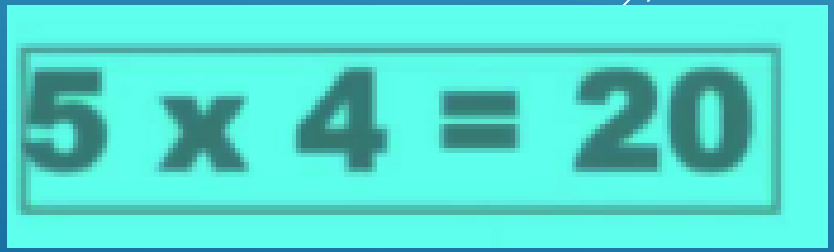
5 X 2 =
(Year 2)



Children would count in 2s to solve this.

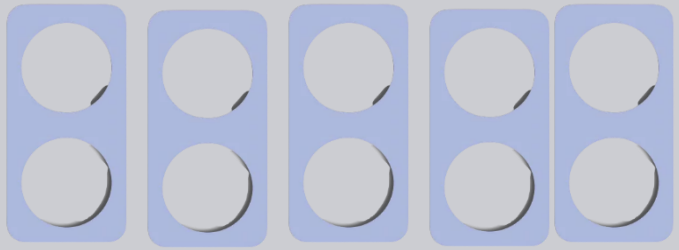
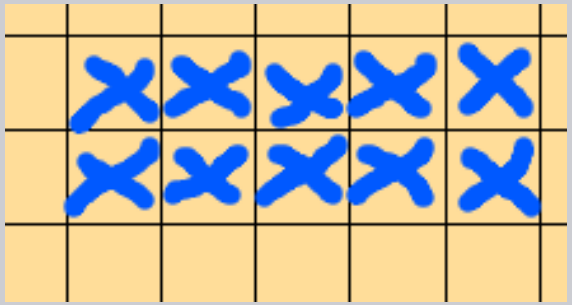
ABSTRACT

- The abstract stage involves the introduction of abstract concepts such as the written representation of number and mathematical symbols.
- It is important that children have a secure understanding of the concrete and pictorial stages before being introduced to this stage.
- This way misconceptions are easier to pick up on and address.



ABSTRACT

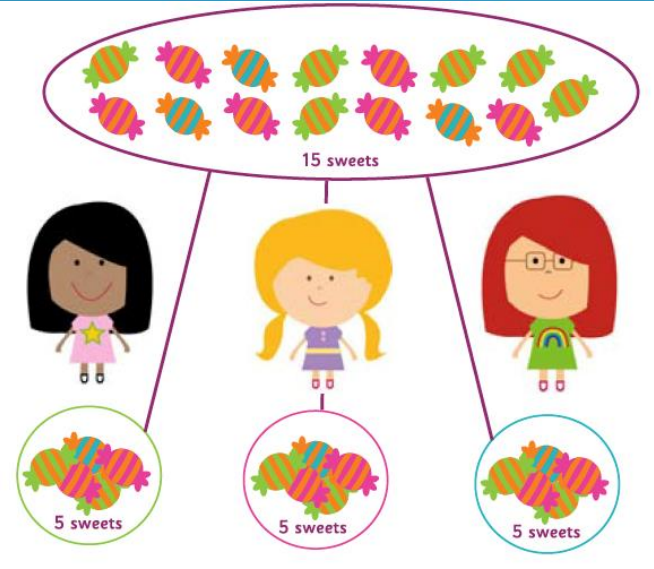
- In KS1 the abstract stage of multiplication consists of children reading and writing multiplication equations and understanding their meaning.
- It also involves beginning to solve multiplication equations mentally.
- This includes counting in 2s, 5s and 10s to solve the equations.
- The children are only introduced to the abstract representation of multiplication when they reach Year 2. In Year 1 the only abstract they would be taught is the repeated addition equation.

Concrete	Pictorial	Abstract
		2 + 2 + 2 + 2 + 2 = 10 5 X 2 = 10

DIVISION

VOCABULARY - DIVISION

- We first explain to children that division means 'to share equally' or 'equal groups'.
- This is how children refer to division in Year 1.
- They do not use the language of 'divide' or 'divided by' until Year 2.



CONCRETE

- When it comes to division we first demonstrate using cubes, counters or other everyday objects.
- This is to allow children to understand that division means to share and so that they are able to see this clearly.
- We will also use numicon once children have understood the concept of sharing equally.

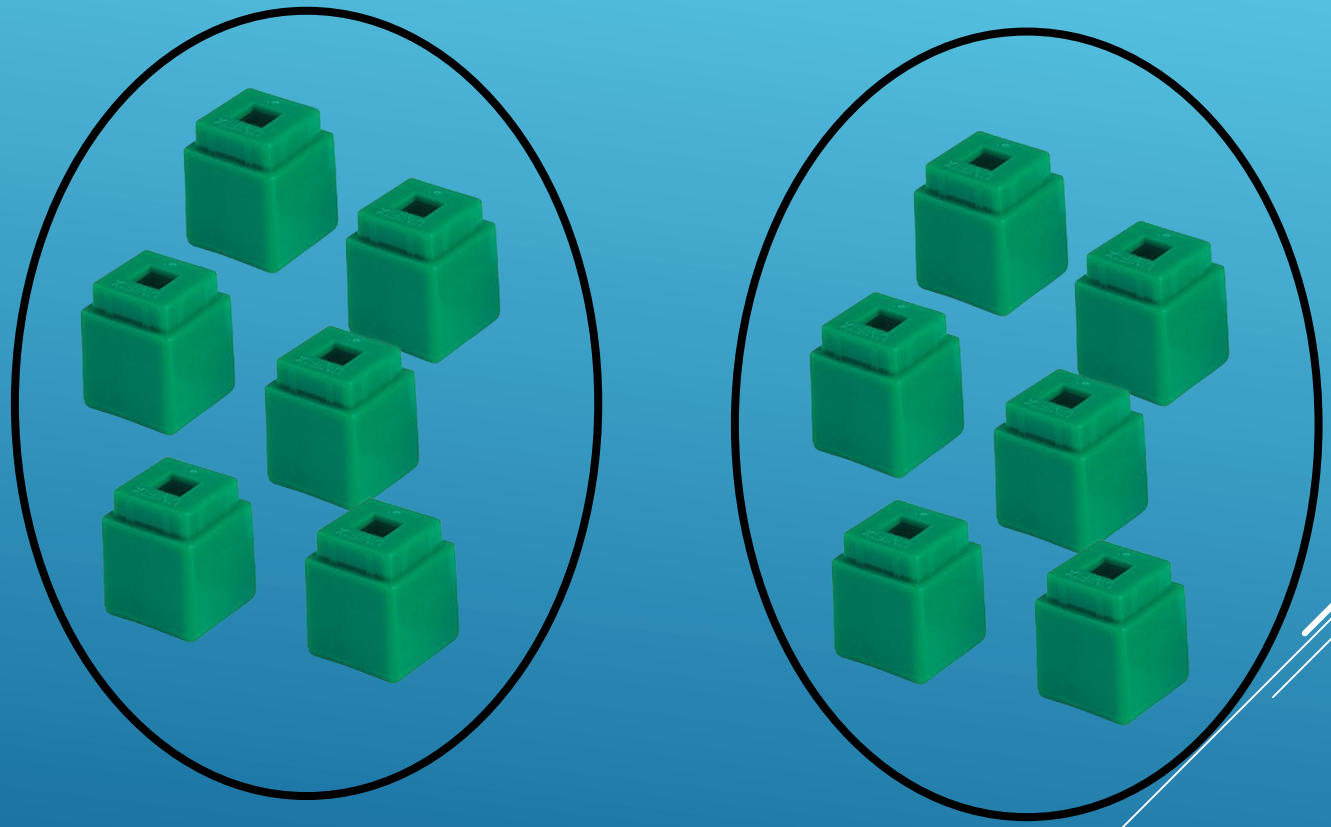
DIVISION - CONCRETE

12 shared between 2 =

(Year 1)

12 ÷ 2 =

(Year 2)



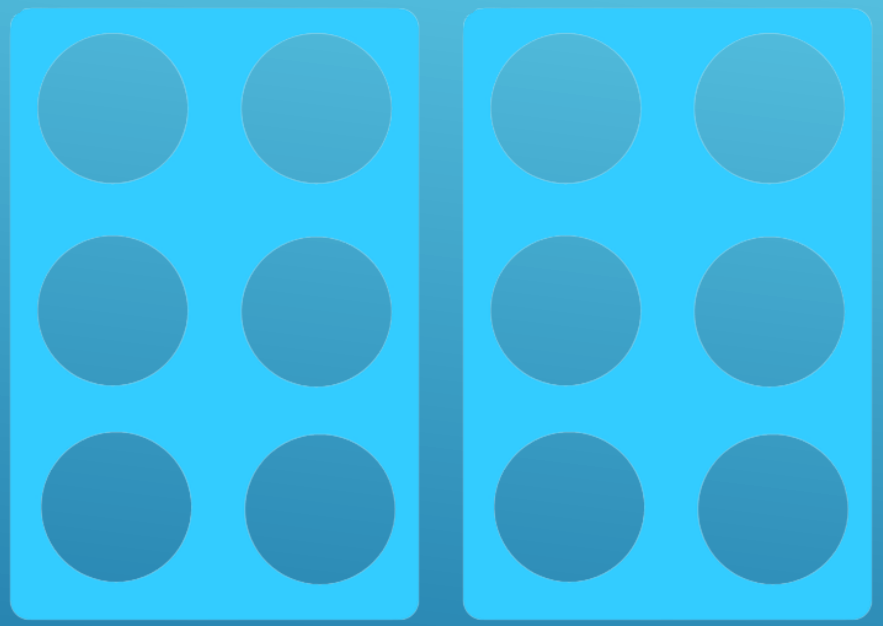
DIVISION - CONCRETE

12 shared between 2 =

(Year 1)

12 ÷ 2 =

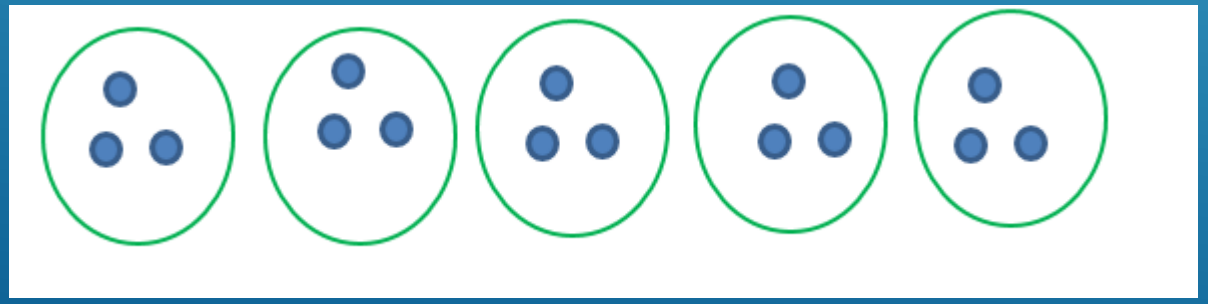
(Year 2)

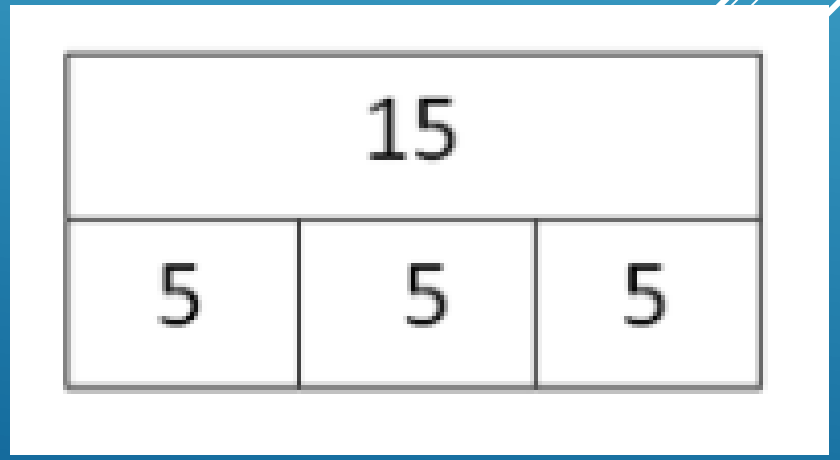


Numicon is a resource children can use to check their answer. It is also useful to show the inverse of multiplication.

PICTORIAL

- Children are taught the pictorial representation of division alongside the concrete.
- We represent division pictorially by drawing and sharing into groups or by drawing bar models.

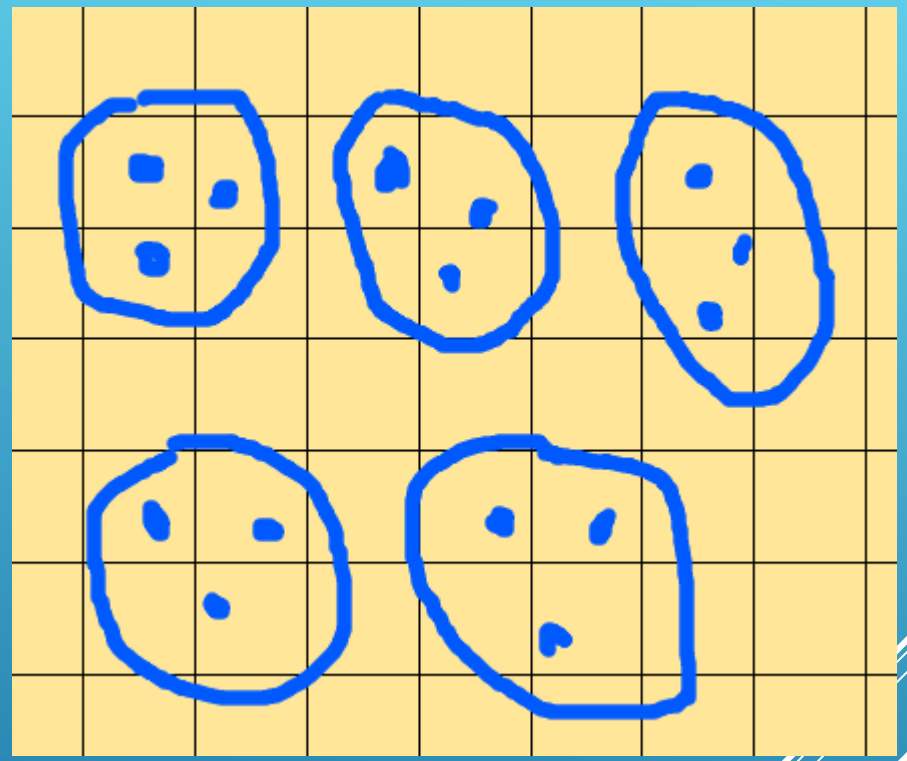




DIVISION - PICTORIAL

15 shared between 5 =
(Year 1)

15 ÷ 5 =
(Year 2)



In Year 2 we explain to children the inverse. We have made 5 groups of 3.
5 X 3 = 15.

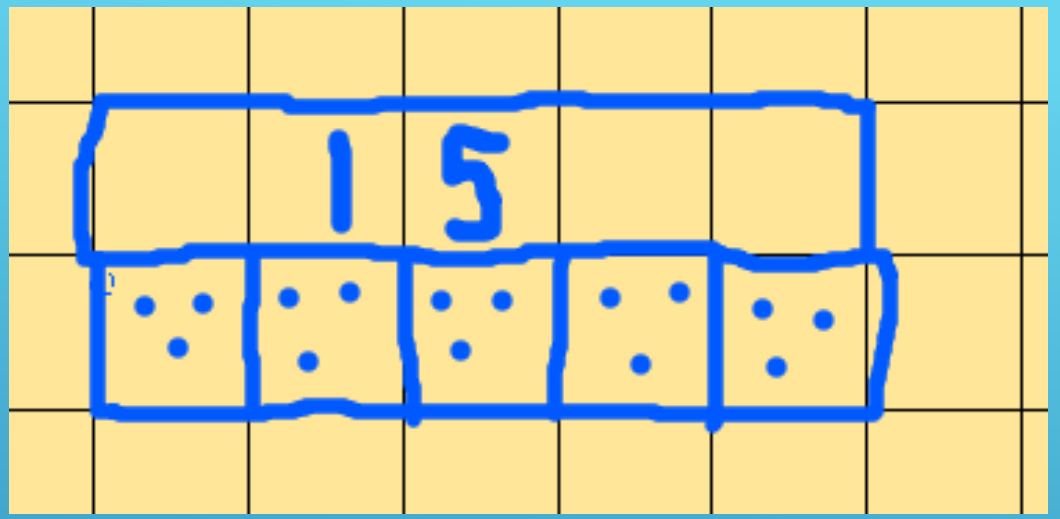
DIVISION - PICTORIAL

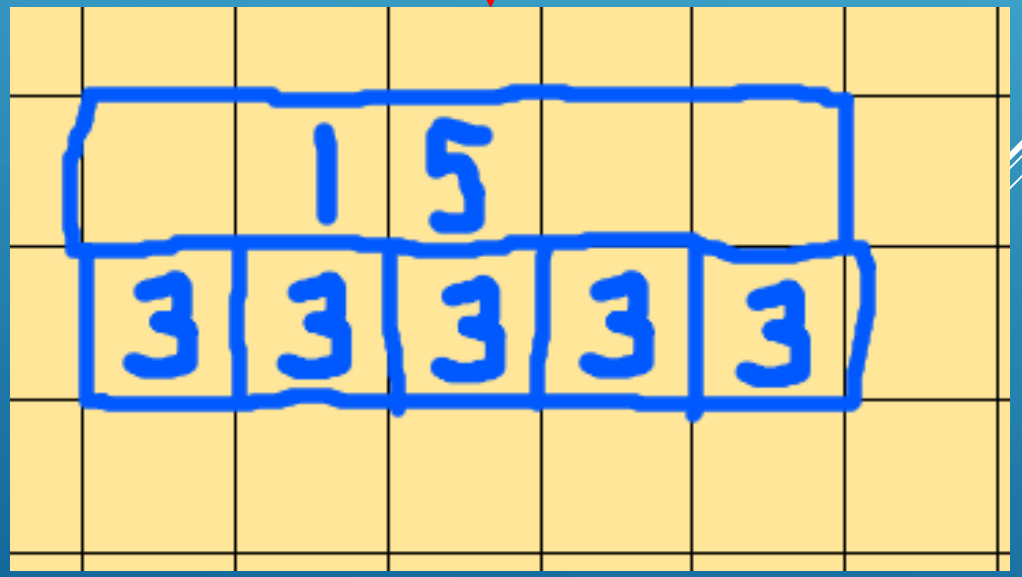
15 shared between 5 =

(Year 1)

15 ÷ 5 =

(Year 2)





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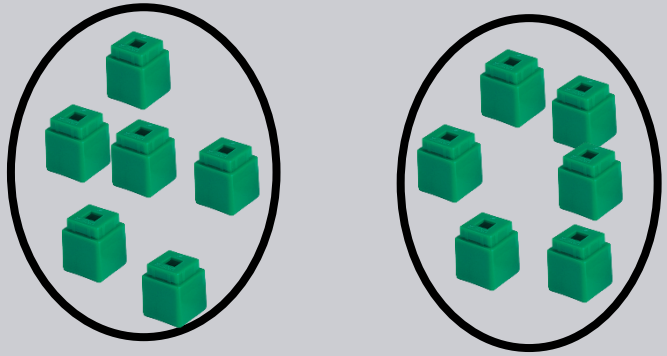
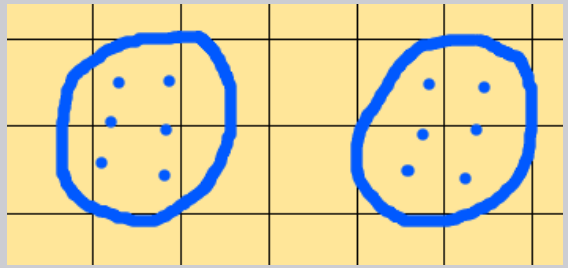
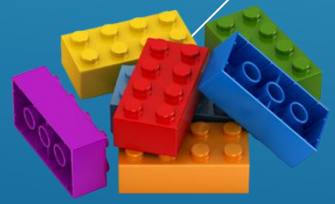
Concrete	Pictorial	Abstract
		12 ÷ 2 = 6

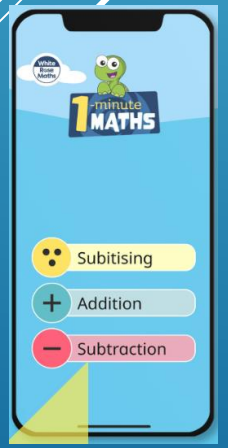
HOW CAN YOU HELP AT HOME?

- Encourage children to solve equations using concrete objects or by drawing pictorial representations. Ensure this is understood before moving onto the abstract.
- Concrete resources, such as numicon and cubes are available to buy at several online retailers. Alternatively you can find online versions to use at home (see link below).
- At home, you can use other objects around the house for the concrete stage of multiplication and division (lego blocks, counters, etc).
- Once children understand the concrete and pictorial representations of equations, you may wish to practice solving multiplication and division mentally by counting in 2s, 5s and 10s. Or by using known facts.
- Times Tables Rockstars (Year 2 upwards) develops children's times table knowledge which will support them when multiplying and dividing.
- White Rose – 1 Minute Maths app – multiplication and division to be added soon!

Numicon- Online Resource

https://mathsbot.com/manipulatives/numberFrames





ANY QUESTIONS?