



KS1 Maths workshop for KS1

Aims of the Workshop

- Understanding what underpins maths teaching, the aims of the National Curriculum.
- The concrete, pictorial, abstract approach.
- Approaches to teaching the four operations.
- Mastery Approach - Fluency, reasoning & problem solving.
- To appreciate the need for mastery in KS1.

Progression from Year 1 to Year 2 - Place value and Number

Year 1

- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
- given a number, identify one more and one less
- identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- read and write numbers from 1 to 20 in numerals and words.

Year 2

- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- recognise the place value of each digit in a two-digit number (tens, ones)
- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems.

Addition and Subtraction

Year 1

- read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$.

Year 2

- solve problems with addition and subtraction:
- using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract 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 (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Multiplication and Division

Year 1

- 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.

Year 2

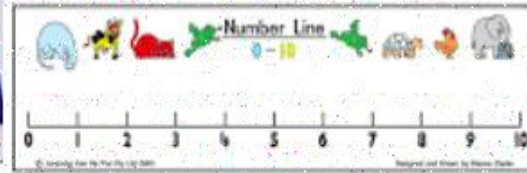
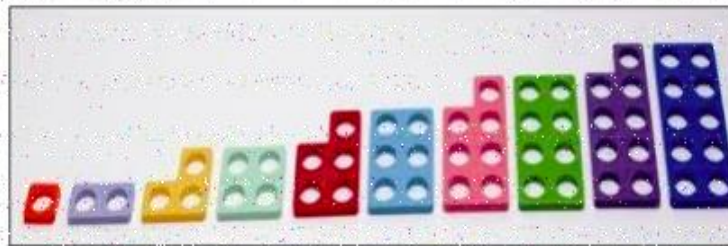
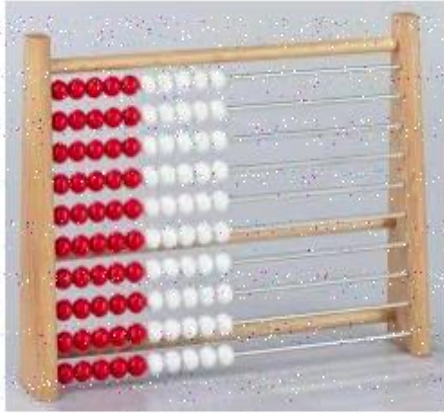
- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) 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.

The CPA approach

- All four operations are taught using this approach throughout the school.
- Concrete
- Pictorial
- Abstract

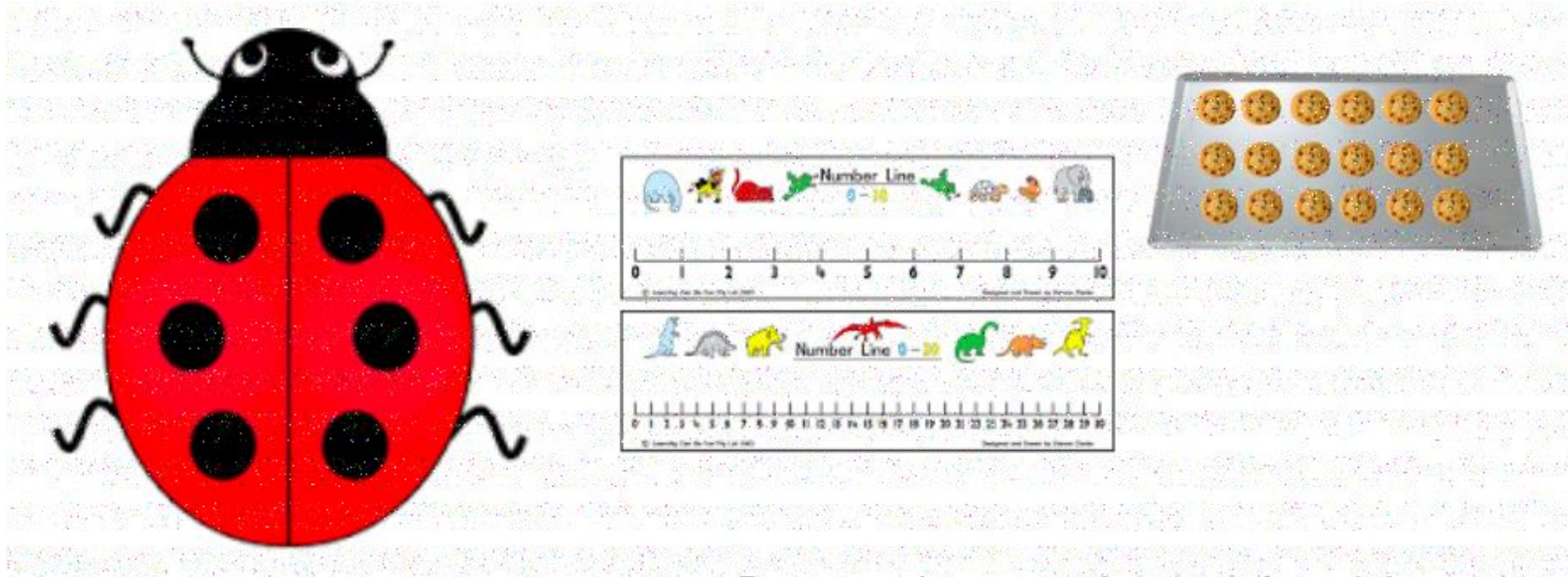
Concrete Resources

Children use concrete manipulative resources to help them understand what they are doing.



Pictorial

Children build on the concrete approach by using pictorial representations. As well as fluency questions, these can also be used to reason and problem solve.



Abstract

With the foundations firmly laid, children should then be able to move on to an abstract approach using number and key concepts with confidence.

Challenge 1

- $12 + 15 =$
- $12 + 11 =$
- $15 + 14 =$
- $17 + 12 =$
- $13 + 13 =$
- $15 + 14 =$

Challenge 2

- $16 + 15 =$
- $17 + 18 =$
- $16 + 19 =$
- $19 + 13 =$
- $17 + 15 =$
- $15 + 17 =$

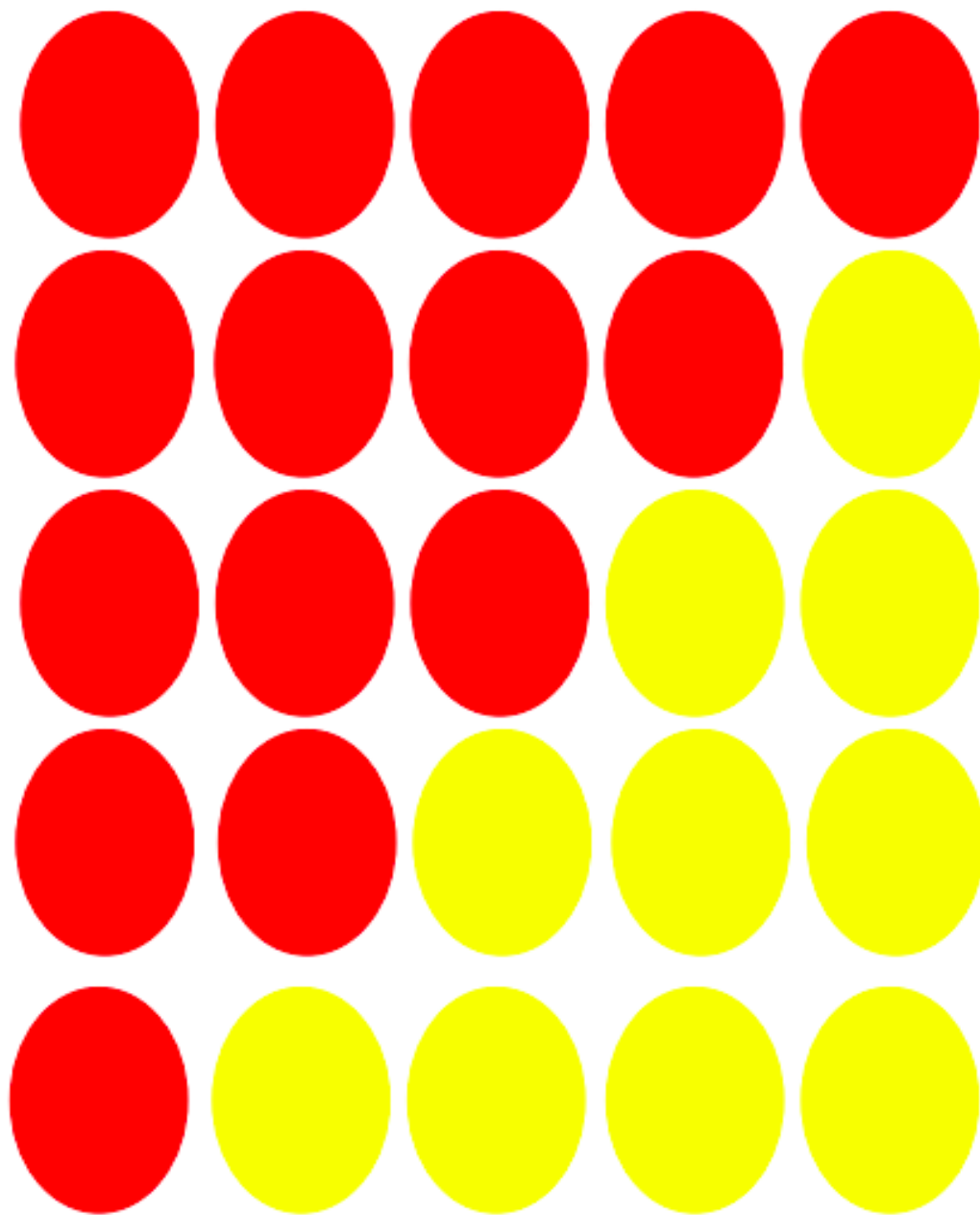
Challenge 3

- $31 + 25 =$
- $82 + 23 =$
- $66 + 25 =$
- $59 + 22 =$
- $177 + 146 =$
- $165 + 132 =$

Use of well known mental calculation strategies.

- *Partition and recombine*
- *Doubles and near doubles*
- *Use number pairs to 10*
- *Adding near multiples of ten and adjusting*
- *Using patterns of similar calculations*
- *Using known number facts*
- *Counting on*

Build it
Draw it
Write
it





$5 + 0 =$
5
 $4 + 1 =$
5
 $3 + 2 =$
5
 $2 + 3 =$
5
 $1 + 4 =$
5



Number and The Four Operations



- ▶ Place Value and Number
- ▶ Addition
- ▶ Subtraction
- ▶ Multiplication
- ▶ Division



Place value

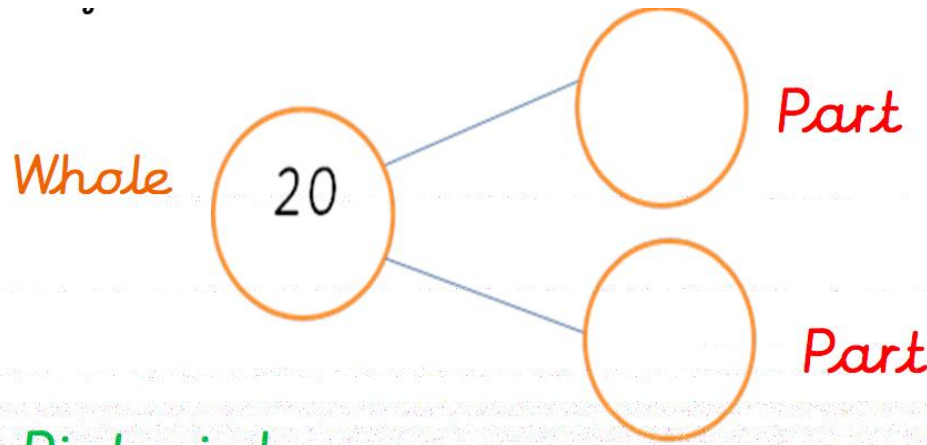
How many tens and ones?

	
tens = ___	ones = ___

	
tens = ___	ones = ___

	
tens = ___	ones = ___

	
tens = ___	ones = ___



Place Value Regroup - up to 99

73	=	<input type="text"/>	tens	+	<input type="text"/>	ones
95	=	<input type="text"/>	tens	+	<input type="text"/>	ones
23	=	<input type="text"/>	tens	+	<input type="text"/>	ones
48	=	<input type="text"/>	tens	+	<input type="text"/>	ones
54	=	<input type="text"/>	tens	+	<input type="text"/>	ones
60	=	<input type="text"/>	tens	+	<input type="text"/>	ones
98	=	<input type="text"/>	tens	+	<input type="text"/>	ones
87	=	<input type="text"/>	tens	+	<input type="text"/>	ones
11	=	<input type="text"/>	tens	+	<input type="text"/>	ones
63	=	<input type="text"/>	tens	+	<input type="text"/>	ones
59	=	<input type="text"/>	tens	+	<input type="text"/>	ones
28	=	<input type="text"/>	tens	+	<input type="text"/>	ones

Understanding Equivalence

*Understanding the
equals sign*

the same as

equivalent

=

*Not the answer
to a calculation!*

equal

balance

Addition

Varied vocabulary is important!

Addition

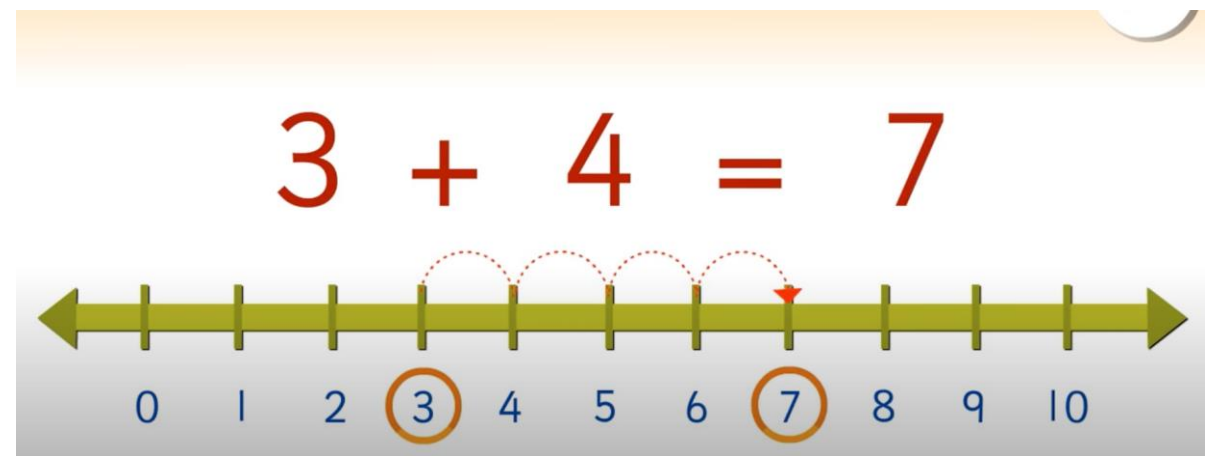
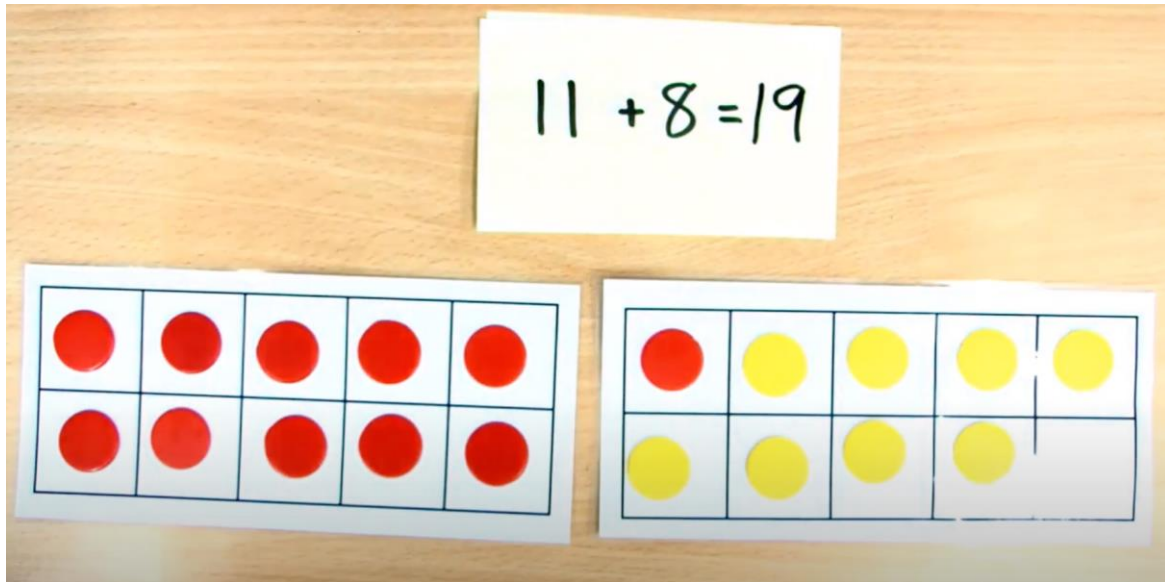
Plus

Add

More

Commutative

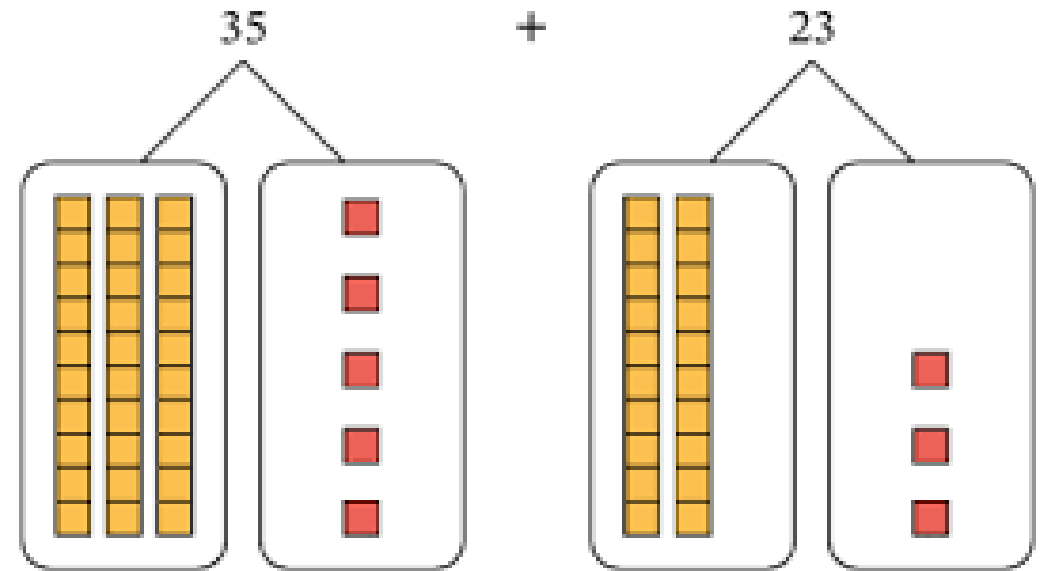
Stages of teaching addition



Hundreds Board

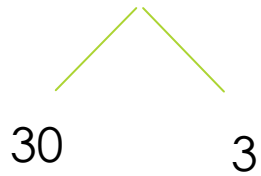
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

$23 + 5 = 28$
 $38 + 4 = 42$



Expanded Method

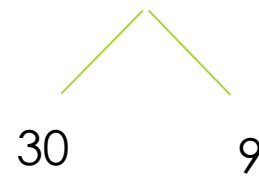
$$41 + 33 = 74$$



$$41 + 3 = 44$$

$$44 + 30 = 74$$

$$55 + 39 = 74$$



$$55 + 9 = 64$$

$$64 + 30 = 94$$

Moving on to more formal methods... Only when the children have secure understanding of place value

$26 + 35 = \underline{\quad}$

26	Tens	Ones
+ 35		●●●●
<hr/>		●●●●

Subtraction

Varied vocabulary is important!

take-
away

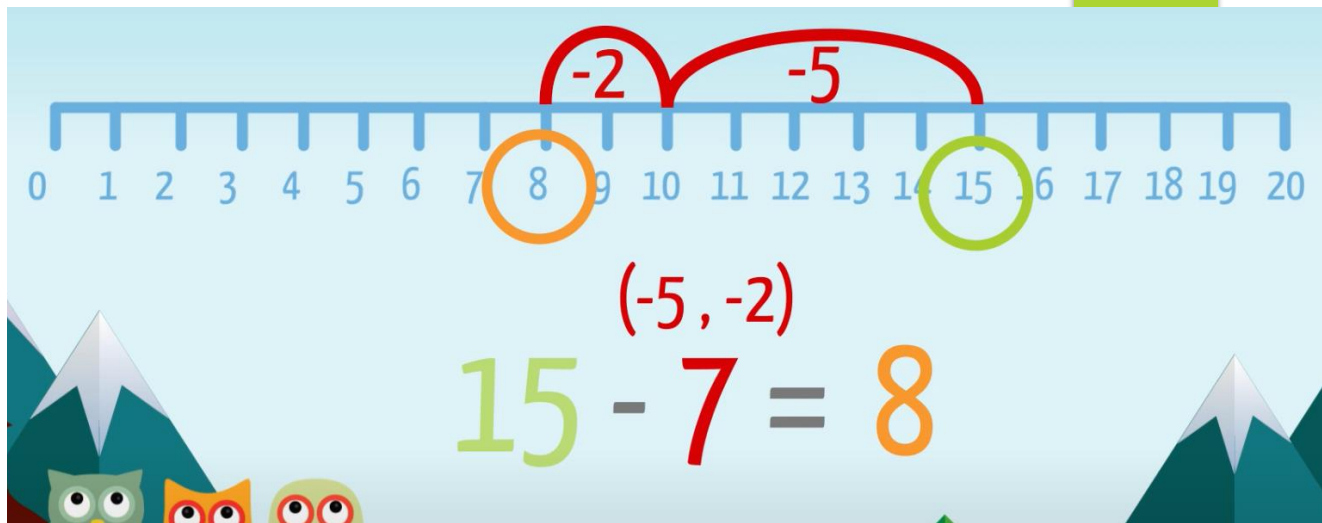
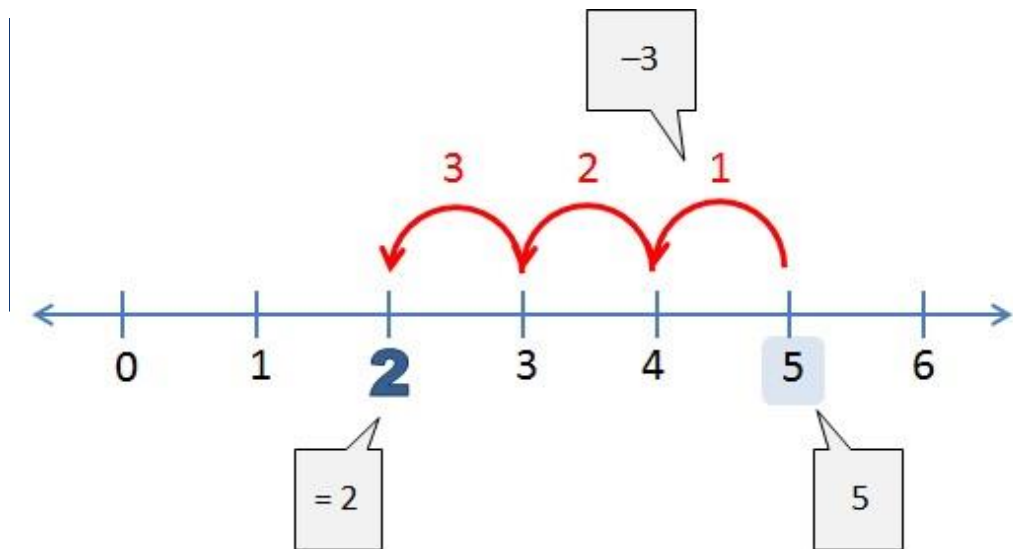
less

fewer

Subtraction

minus

difference



Subtracting on the Hundred Chart

$$29 - 5 = 24$$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

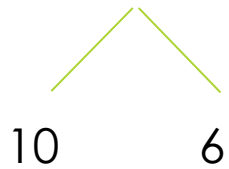
	$54 - 12 = \underline{\quad}$
--	-------------------------------

$13 - 2 =$ 	$16 - 4 =$
$18 - 3 =$ 	$15 - 1 =$

$$42 - 7 = 35$$

Expanded subtraction

▶ $55 - 16 =$



$$55 - 5 - 1 = 49$$

$$49 - 10 = 39$$

- ▶ The children are expected to think how they would get to the nearest 10. Therefore, splitting the ones into 5 and 1.

Multiplication

Varied
vocabulary
is important!

Multiplication

Times

Groups

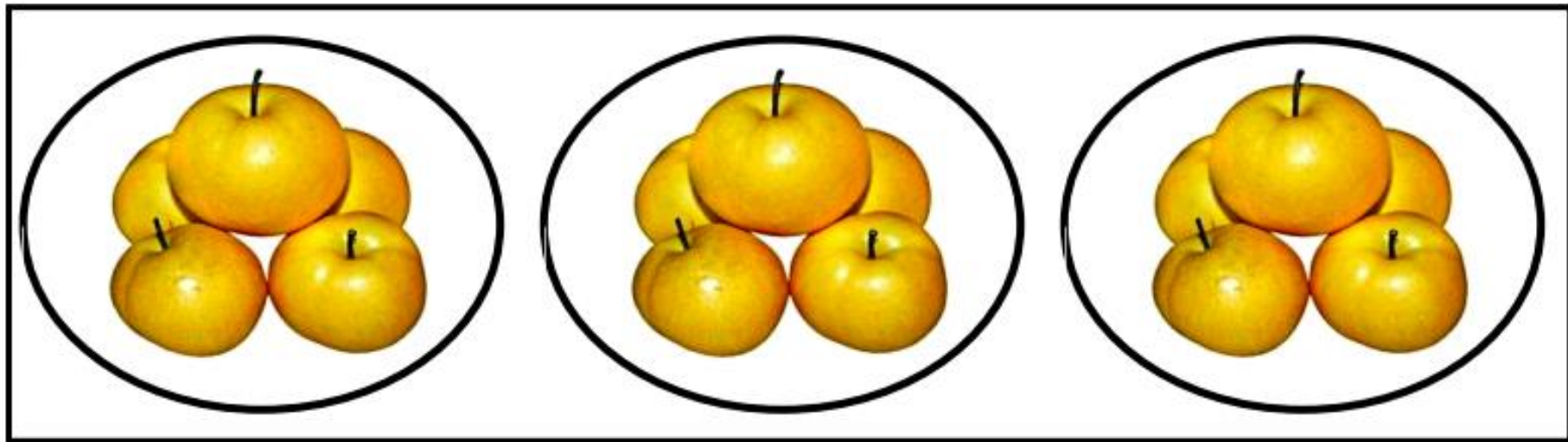
Array

Equal

Repeated addition

$$5+5+5 = 15$$

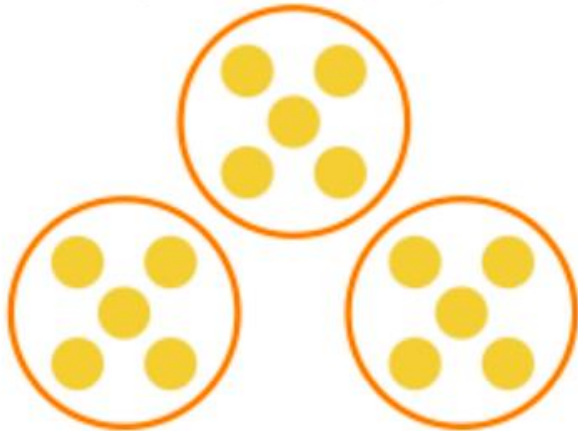
1.



Introduce the multiplication sign \times
 $5+5+5 = 15$ is the same as $3 \times 5 = 15$

Equal Groups

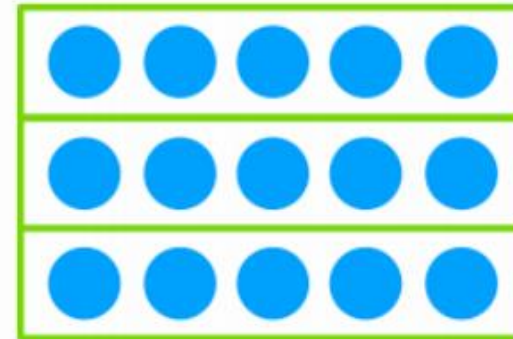
Use the same number of ones in each group.



$$3 \times 5 = 15$$

Array

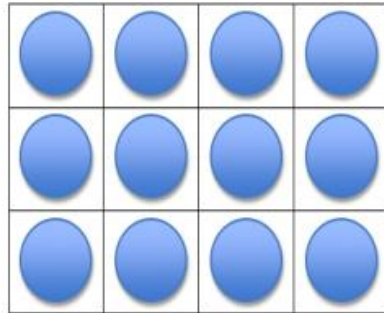
Rows and columns with an equal amount in each.



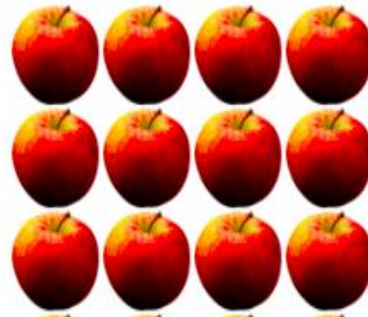
$$3 \times 5 = 15$$

Helping children see links

Using the mathematical language – commutative



I can see 3 rows of 4



If you go round the other side, it's 4 rows of 3

I can see 3 and 3 and 3 and 3



I can see 4 and 4 and 4



Division

Varied vocabulary is important!

Division

Share

Equal

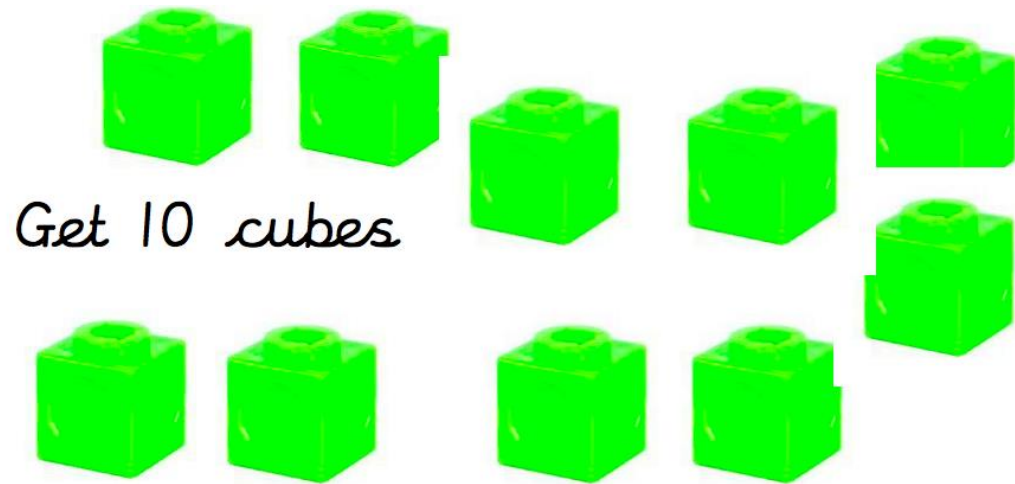
Groups

Division is an introduction to sharing equally and fractions.

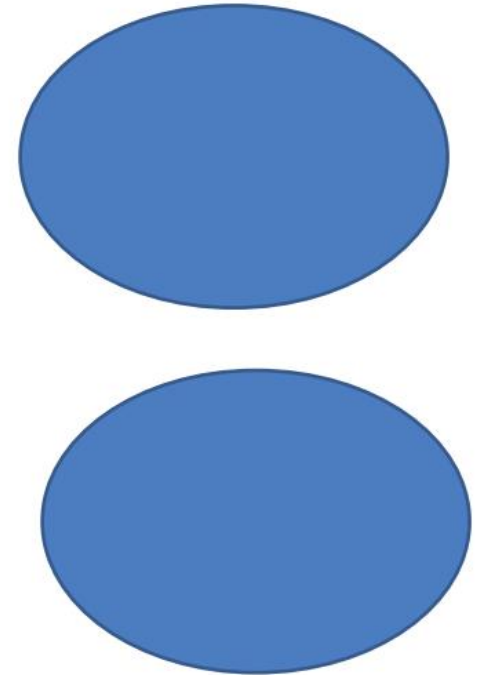
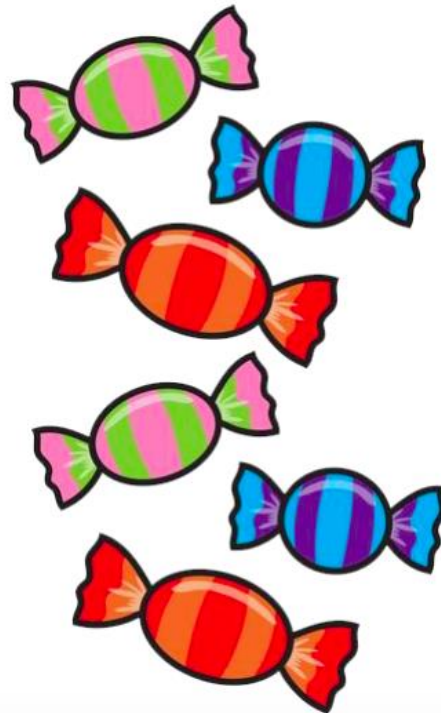
Children can..

- ▶ Make a half turn.
 - ▶ Turn the hands of a clock half way
 - ▶ Break a bar of chocolate into two equal pieces.
-
- ▶ In KS1, we build on these skills and link them to fractions and division.
 - ▶ Eg,. If we share 12 smarties between 3 people equally, each person gets 4. So $\frac{1}{3}$ of 12 is 4.

How many ways can you share ?



How can you share them between you and your friend?



Then we introduce the division sign.

$$10 \div 2 =$$

$$15 \div 3 =$$

$$20 \div 5 =$$

Teaching for Mastery

- ▶ These methods and overviews have number at heart. A lot of time is spent reinforcing number and concepts to build competency fluency and confidence.
- ▶ Ensures the whole class stays together and work as a whole group.
- ▶ They provide plenty of time to build reasoning and problem-solving elements into the curriculum.

Fluency

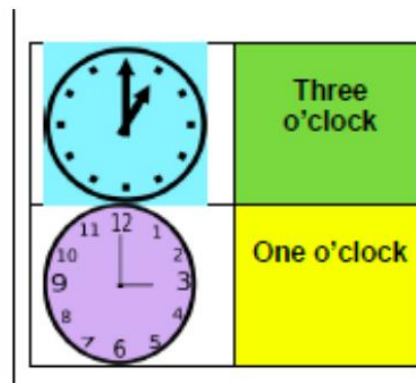
- *By using the concrete, pictorial and abstract the children will become fluent when working with numbers and the methods.*

$$5 + \square = 10$$

$$10 + \square = 20$$

$$17 + \square = 23$$

Match the words to the correct clock:



Reasoning

- The children will begin to explain their answers and give reasoning for the method they used.

Posing questions...

Captain Conjecture says, 'If you add 0 to a number, the number stays the same.'

Do you agree?

Explain your reasoning.



I wonder...

How many number sentences can you make?

0	1
2	3

How do you know you have all of them?

+ =

I have got all of the number sentences because...

Problem Solving

Solving a problem involves...

- *Identifying and understanding what the problem is*
- *Planning how to solve it*
- *Working out the answer*
- *Checking results*

- *Peter is eating his lunch at half past 12. Jane is eating her lunch half an hour later. Tick the clock which is showing when Jane eats her lunch.*



How can you help at home?

- ▶ Fluency practise
 - ▶ Use maths in everyday life.
 - ▶ Ask your child how they worked a problem out.
 - ▶ NEVER say 'I don't do Maths' or 'I wasn't good at maths when I was at school.'
 - ▶ Make maths FUN!
- ▶ One extra note from Year 1 – please help your child learn number bonds to 10 & 20!