KS1 Maths Parent Workshop

Grange Park
Primary School

Led by Elena Yiapanis: Assistant Headteacher and Maths Subject Leader

Aims of the today's session:

- Look at our calculation policy with a focus on the four operations (addition, subtraction, multiplication and division)
- Discuss how mathematics is taught through a CPA approach (Concrete-Pictorial- Abstract)
- Look at the the concrete resources that we use at school to support mathematical teaching and learning
- Discuss the importance of oracy in maths and mathematical language
- An insight into the 'teaching for mastery' approach to mathematics
- How to support children in adopting a growth mindset in maths so they can achieve their potential.
- How to support your children at home with their maths learning

CPA Approach: Concrete Pictorial Abstract

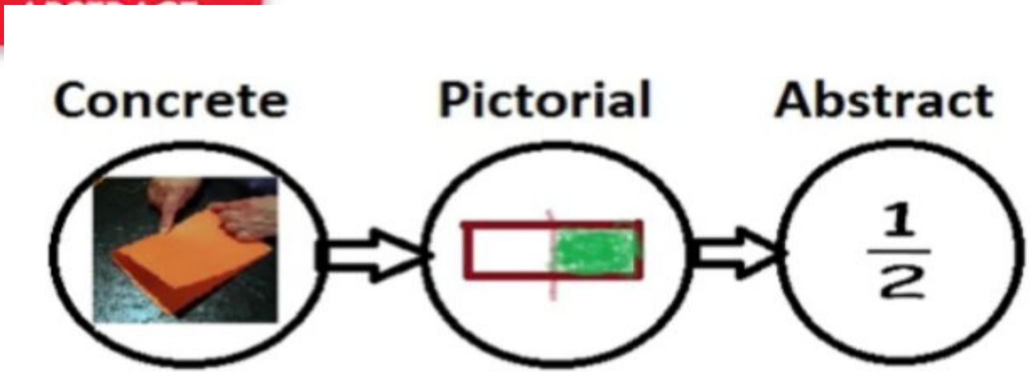
- **Concrete:** 'doing' the maths- introducing real objects that can be manipulated to bring the problem to life. Eg: money, counters.

- **Pictorial**: 'seeing the maths'- making connections between the concrete and the pictorial representations and the pictorial and the abstact. Eg: part whole models, bar models, ten frames.

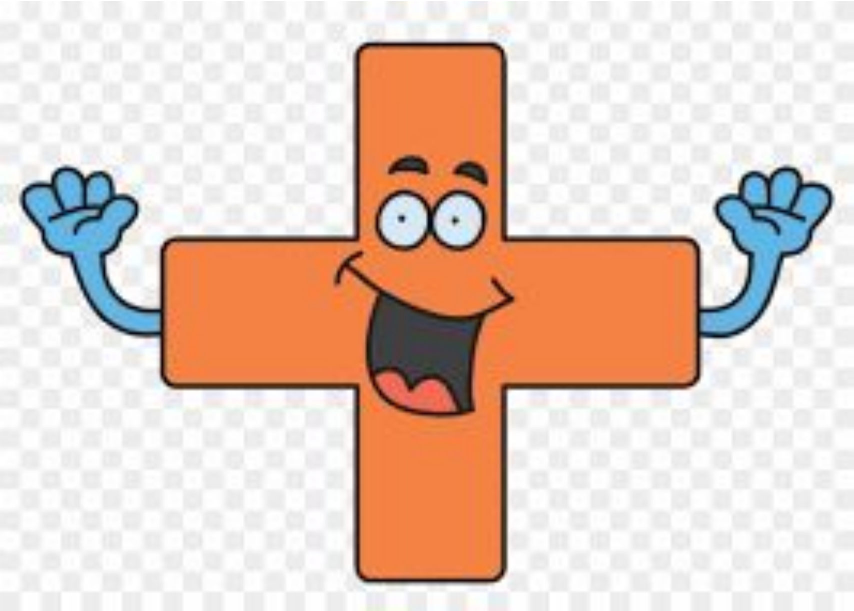
- **Abstract:** the ultimate goal is for children to understand abstract mathematical concepts, signs and notation. When a child demonstrates with concrete models and pictorial representations that they have grasped a concept, we can be confident that they are ready to explore the abstract.

The CPA Approach

Maths should be practical for all ages and the CPA approach used at any time and with any age to support understanding



Addition in KS1



Y1

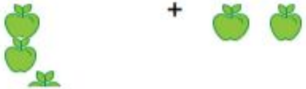
Through practical activities in meaningful contexts and informal written methods.

- Recall number bonds to 20 and within 20.
- Pictures and Marks – 1 more / 2 more.

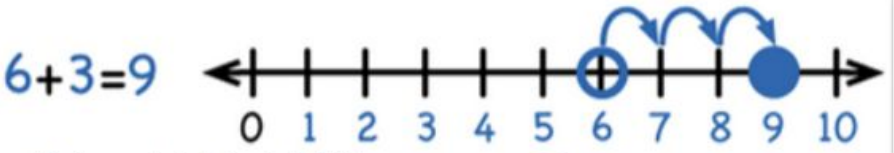
  There are 3 cars in the garage. 1 more came along.

3 + 1 = 4   4 + 1 = 5

Terry has 3 apples and Tony has 2 apples. How many altogether?



- Number lines to 20.



- Derive related facts to 20.

  □= 5 + 4

  5 + 4 = □

  □+ 4 = 9

  □+□ = 9

- Money and addition up to 20p.
- Read, write and interpret mathematical statement involving addition (+) and equals (=).

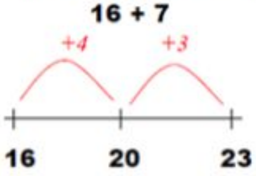
- To count objects, children will use real objects.
- Numbers are be represented through numicon.
- Children will use number lines to count on.

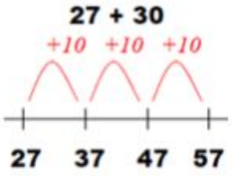
Y2

Through practical activities in meaningful contexts and informal written methods.

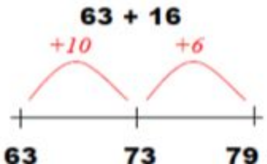
- Fluent recall of bonds to 20 and within 20.
- Derive and use related facts up to 100.
- Addition of money up to £1.

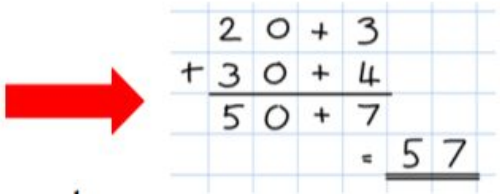
- Add numbers using concrete objects, pictorial representations and mentally.





- Show that addition of two numbers can be done in any order (commutative).
- Recognise and use the inverse relationship between addition and subtraction.
- Progressing to partitioned columnar method (in preparation for year 3).

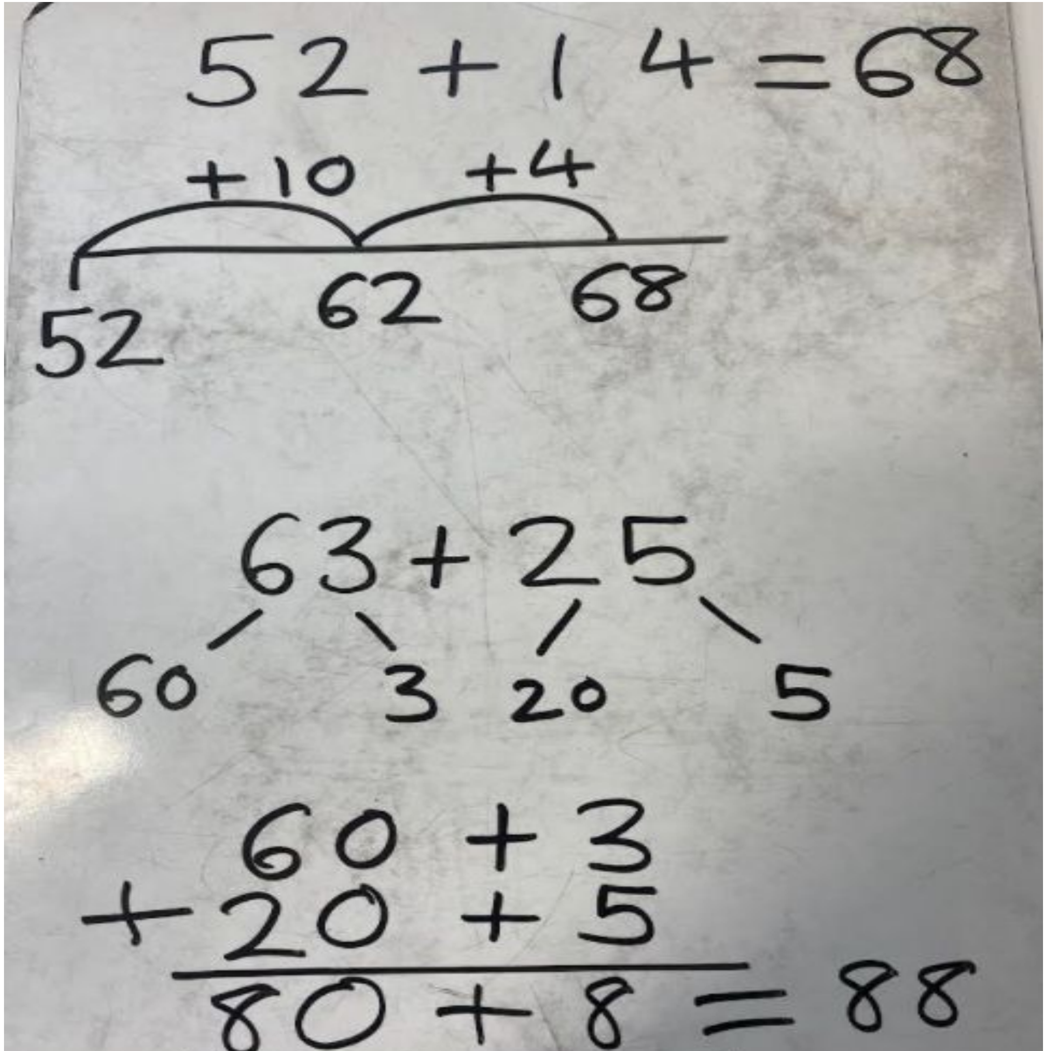




- Number bonds to 20
- Related number facts to 100
- Adding using concrete resources
- Commutative nature of addition (done in any order)
- Counting on using a number line
- Partitioned column method

Number line addition- counting on

Expanded/partitioned column method

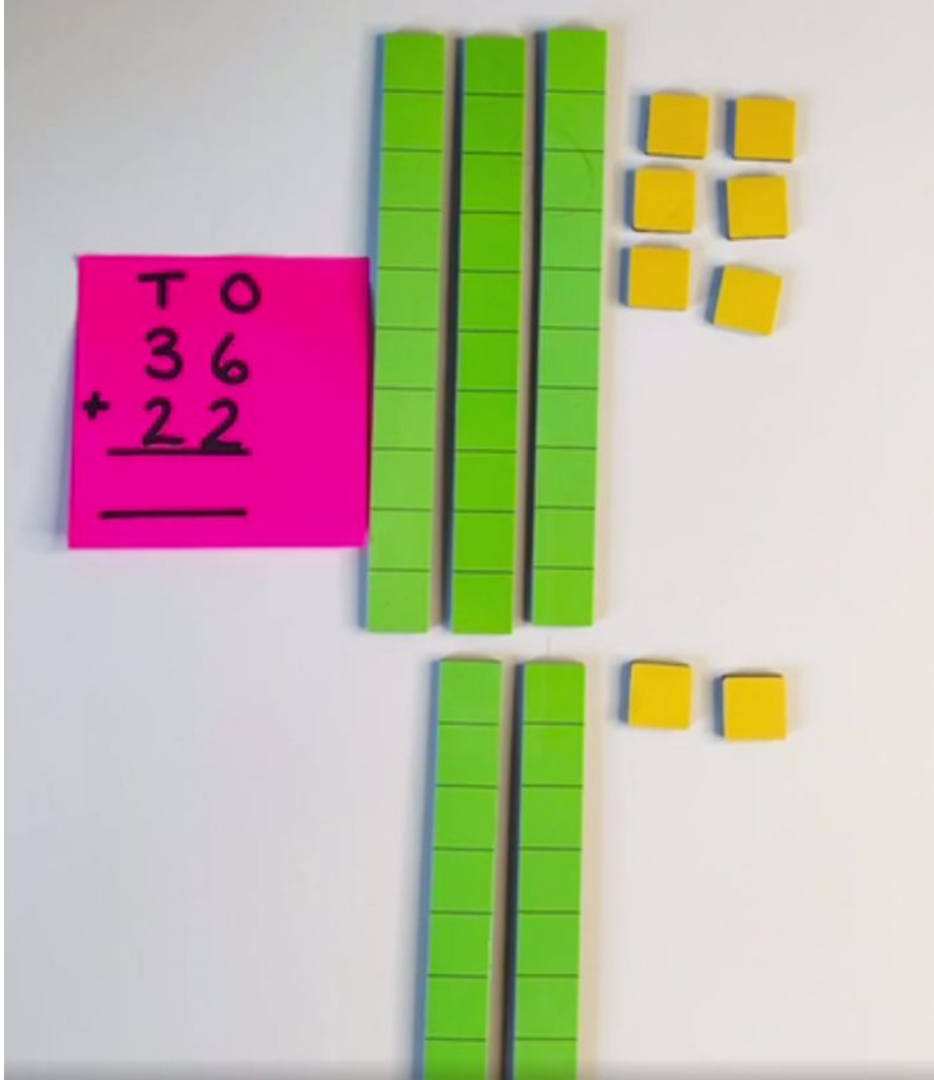


What the children will be moving onto in year 3: column addition

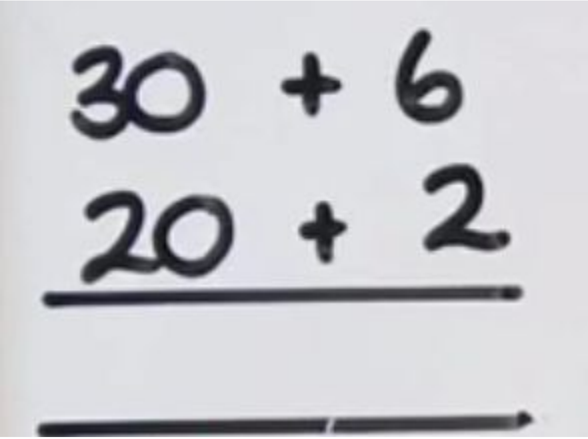
The first bridge between what they know (from keystage 1) and what they see in the form of the columnar calculation.

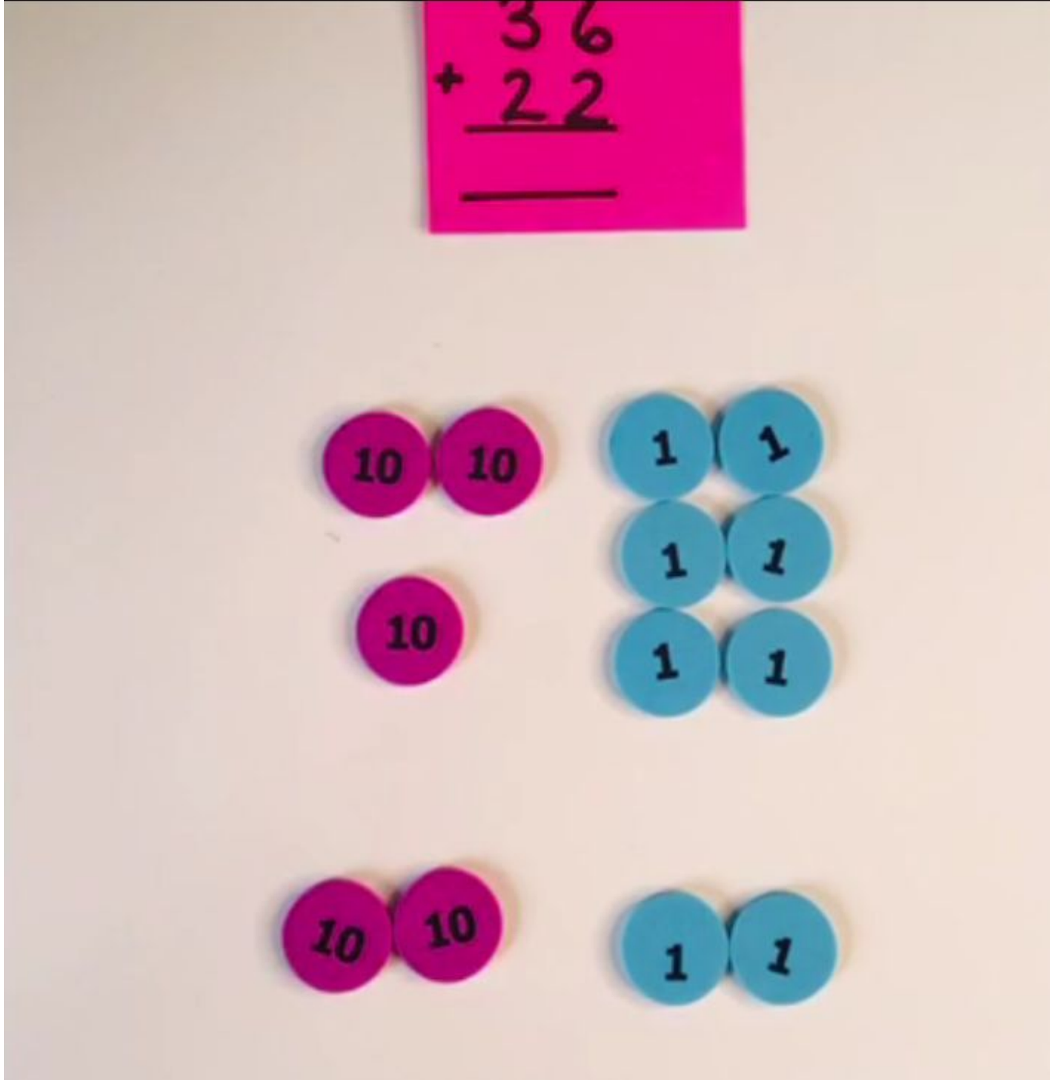
Can the children read the number 36? And represent it?

Can the children partition the number into tens and ones?

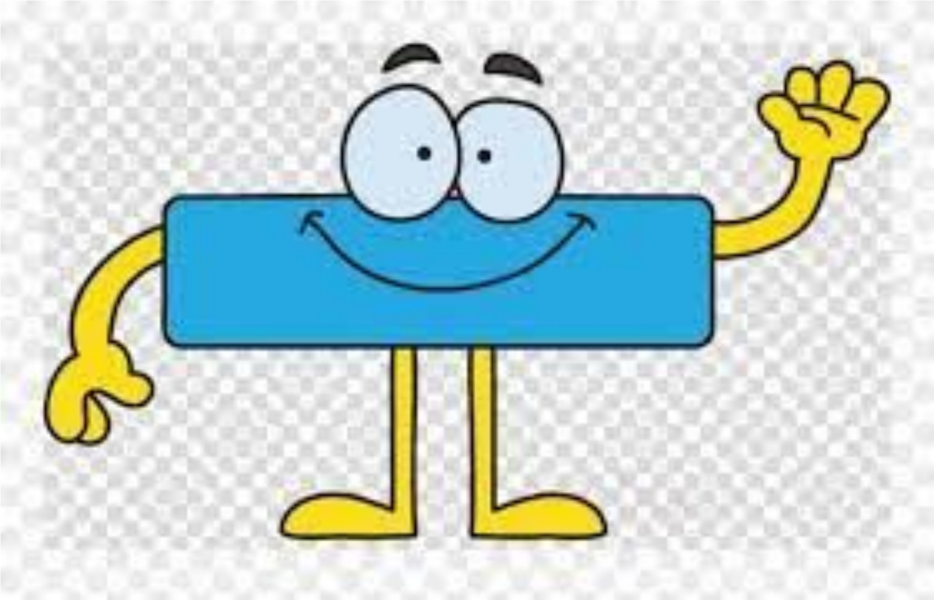


The same calculation represented with place value counters.





Subtraction in KS1



Our calculation policy

Y1

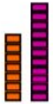
Through practical and meaningful contexts and informal written methods.

- We made 6 cakes. We ate 2 of them.

How many cakes are left?

- Link to vertical number line 6 – 2 =

5 - 3 = 2



- Find the difference within 20.
- Represent and use number bonds within 20.
- Record using subtraction (–) and equals signs (=)
- Derive related facts up to 20.

5 - 2 = □	□ = 5 - 2
5 - □ = 3	3 = □ - 2
□ - 2 = 3	3 = 5 - □
□ - □ = 3	3 = □ - □

- Counting back on a 100 square and a vertical number line.

1:1 correspondence

Linking objects to the value of their number

Finding the difference within 20

Number bonds to 20

Counting back on a 100 square or number line

Our calculation policy

Partitioning the second number

Count back the ones.

Count back the tens.

Find the difference by counting up.

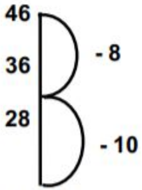
Recognise the inverse relationship between + and -

Y2

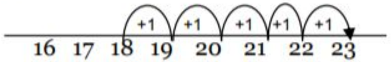
Through practical and meaningful contexts.

- Fluent recall of bonds to 20 and within 20.
- Derive and use related facts up to 100
  e.g. 10 – 7 = 3 so 100 – 70 = 30.
- Counting back by partitioning second number. Subtract the ones first to be in line with columnar subtraction

  E.g. 46 - 18
  46 - 10 - 8

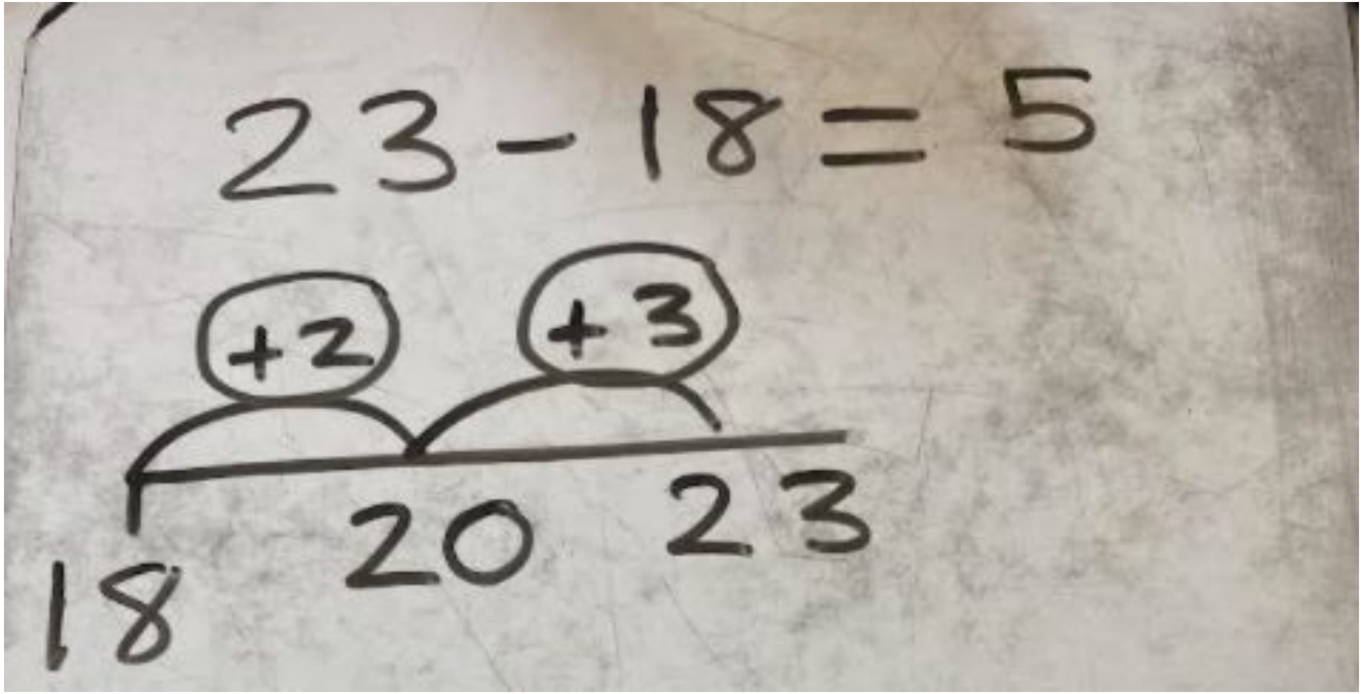


- Find the difference by counting up (only when the difference is small).
  23 – 18 = 5



- Recognise and use the inverse relationship between addition and subtraction
- Show that subtraction is not commutative (done in any order)
- Progressing to the partitioned columnar method in preparation for year 3
- Subtraction of money, including change.

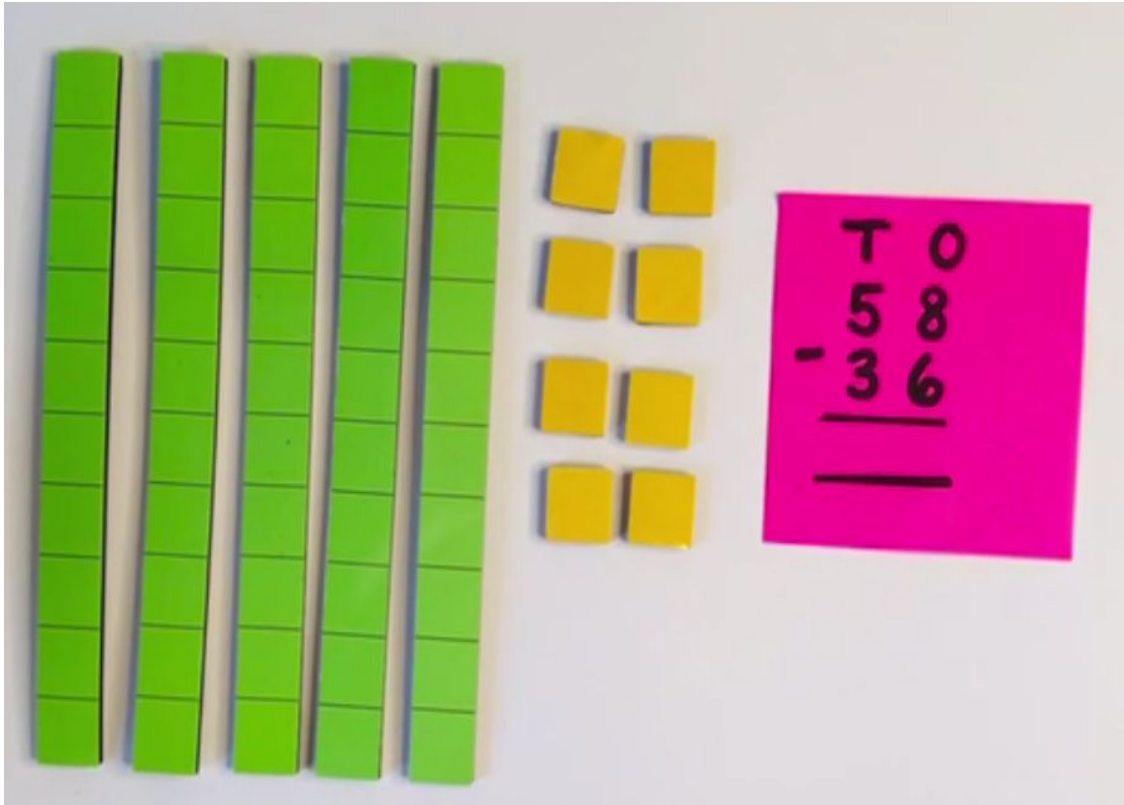
Finding the difference using a number line-counting up



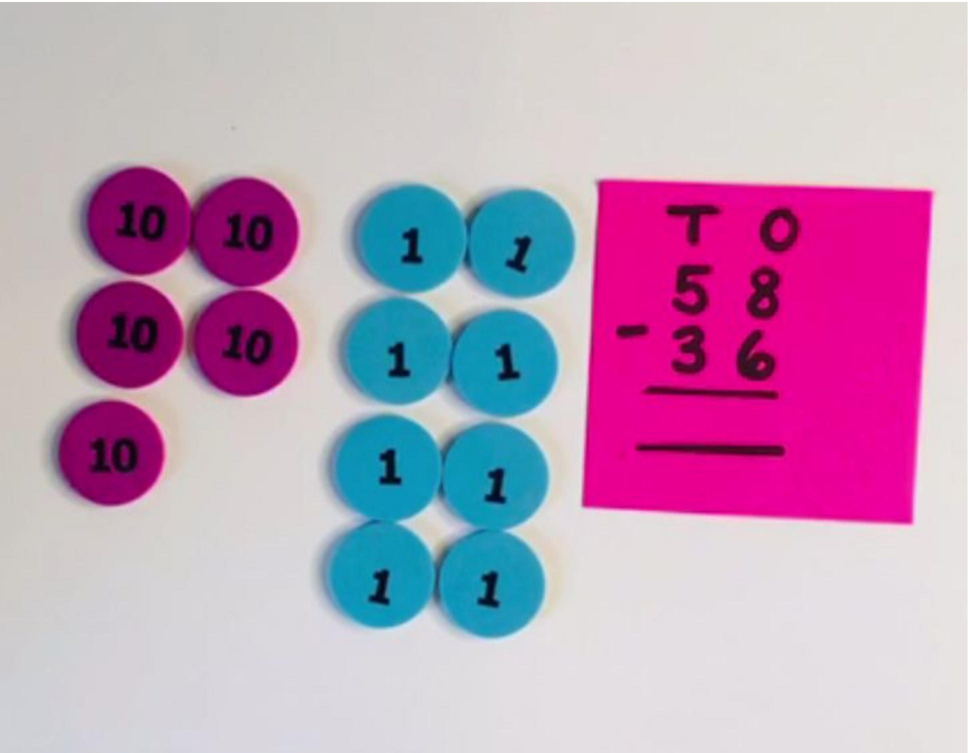
No exchange

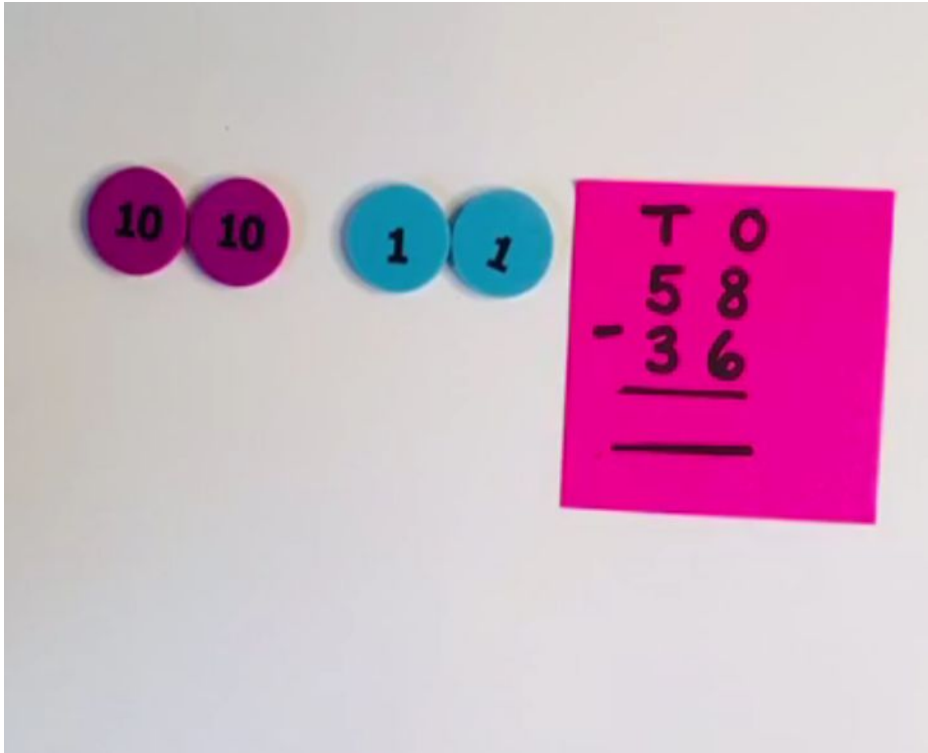
In subtraction we only represent the first number. At the end of my calculation I will have less than I started.

Always take away the ones first!



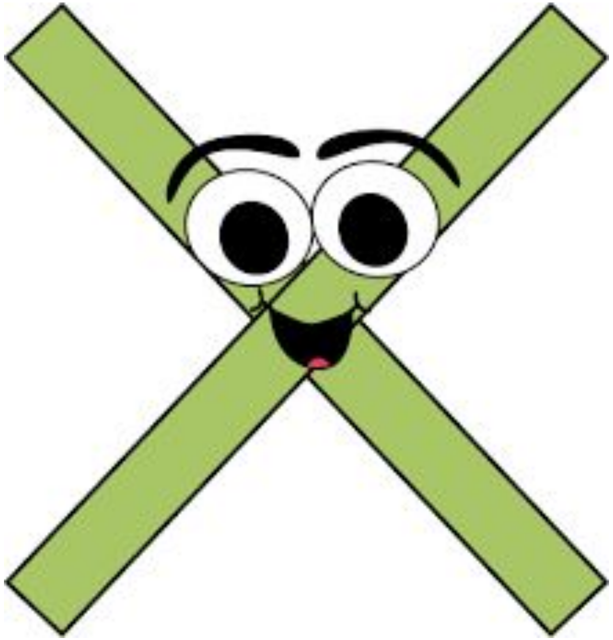

T O
5 8
- 3 6


10
10
10
10
10
1
1
1
1
1
1
1
1
T O
5 8
- 3 6


10
10
1
1
T O
5 8
- 3 6


T O
58
- 36

Multiplication in KS1

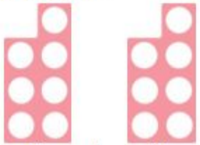


2’s, 5’s and 10’s - spotting the pattern using manipulatives such as numicon, number lines and coins.

Y1

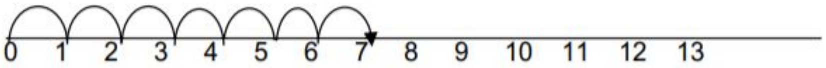
Through practical activities and meaningful contexts using concrete objects, pictorial representations and arrays with the support of the teacher.

- Doubles.



7 + 7 = 14

- Make connections between arrays, number patterns and counting in 2’s, 5’s to 50 and 10’s to 100.
- Use of number lines.



- “100 Square” to count in 2’s, 5’s and 10’s.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

- There are 2 sweets in one bag. How many sweets are there in 5 bags?

- Counting multiples of coins: 2p, 5p, 10p.

2p + 2p + 2p

Very important that this maths knowledge builds through concrete meaningful contexts using concrete objects.

Repeated addition.

Knowing the multiplication facts for the 2, 5 and 10 times tables.

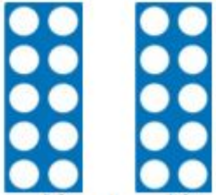
Using the X symbol

Recognise that multiplication is commutative (can be done in any order)

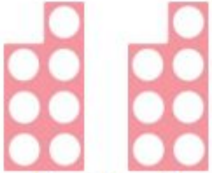
Y2

Through practical activities and meaningful contexts using concrete objects, pictorial representations and arrays.

- Double numbers (by partitioning and recombining) 17 + 17.



10 + 10



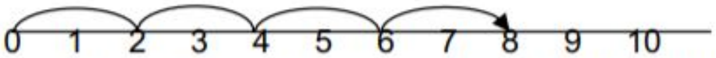
7 + 7

- Understand multiplication as repeated addition/groups/lots.
- Read arrays.

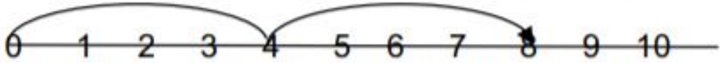
2x4 (2, 4 times)

- Repeated addition on a number line.

2 + 2 + 2 + 2 (4 groups of 2, 2 four times, 2 x 4)



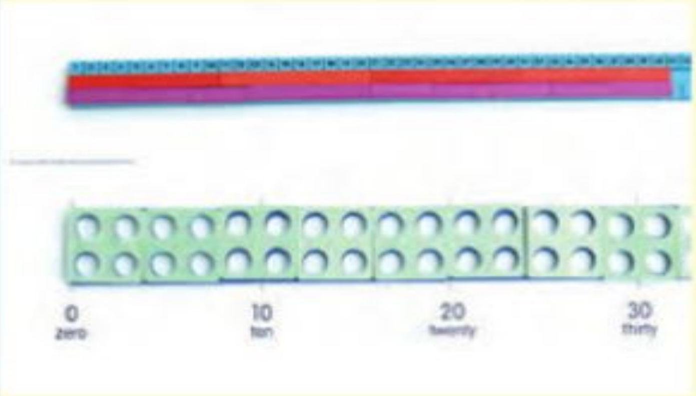
4 + 4 (2 groups of 4, 4 two times, 4x2)



- Know the multiplication tables for 2, 5 and 10.
- Calculate mathematical statements within the multiplication tables using the multiplication (x) and equals (=) signs.
- Show that the multiplication of two numbers can be done in any order (commutative).

Understanding multiplication

Counting in groups of...



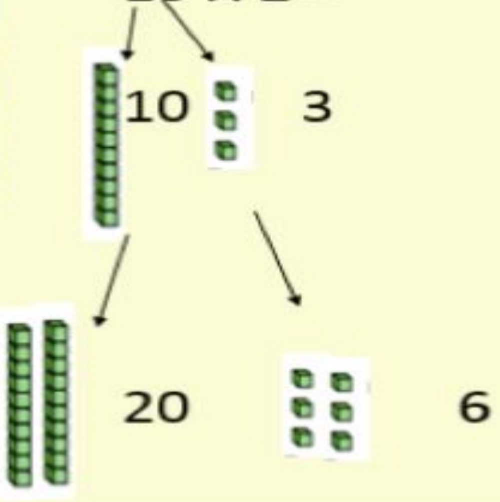
Spotting patterns

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

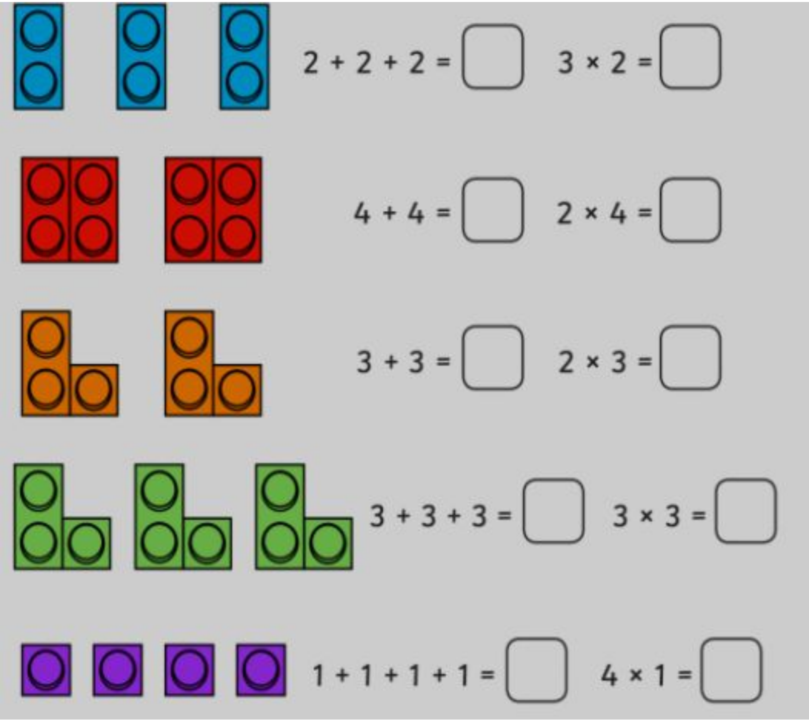
Doubling (and halving!)

3 + 3 = 3 X 2

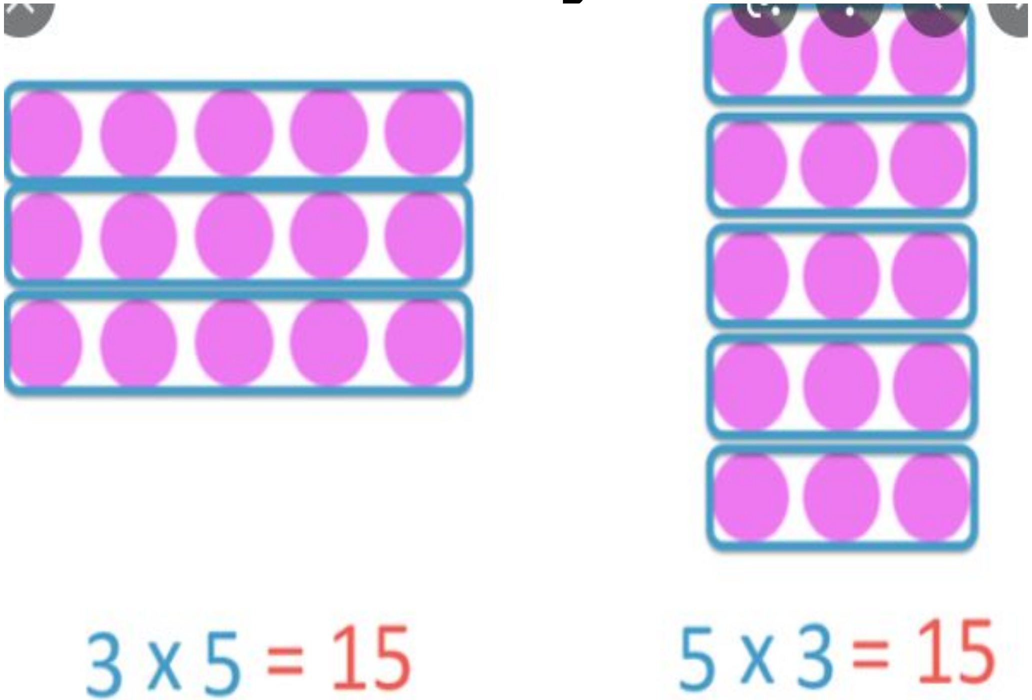
13 X 2 =



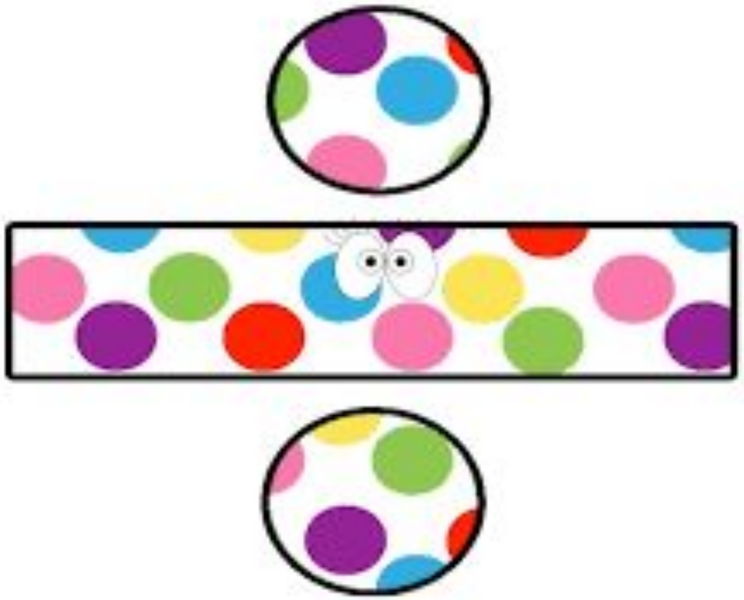
Repeated addition



Arrays



Division in KS1



Division as sharing through practical activities.

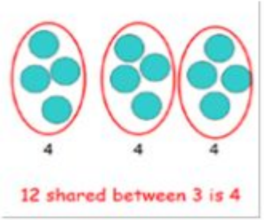
Halving even numbers up to 10

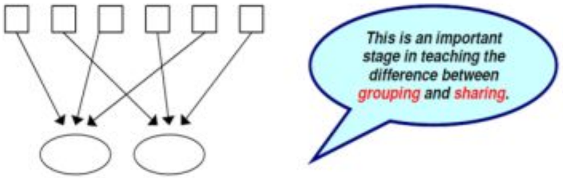
Not introduced to the ÷ symbol until year 2

Y1

Through practical activities in meaningful contexts.

- Division as sharing.
  Emphasise the importance of sharing equally.
  Share a bag of 15 sweets between 5 children – one for you, one for you, one for you, one for you, one for me.





- Introduce halving even numbers up to 10.

Half of 4

National Curriculum requirements:
Solve one step problems involving division, by calculating the answer by using concrete objects, pictorial representations and arrays with the support of the teacher.

Recalling division facts for 2,5 and 10 times

Division as sharing and grouping.

Understanding ÷ 2 as ‘half of’

Recognise relationship between X and ÷

Y2

Through practical activities in meaningful contexts.

- Recall and use division facts for 2, 5 and 10 times tables.
- Continue to use division as sharing.
- Division as grouping.

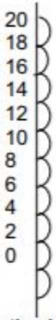
- 15 children get into teams of 5 to play a game. How many teams are there?

How many groups of 5 in 15?

How many 5’s have been counted?

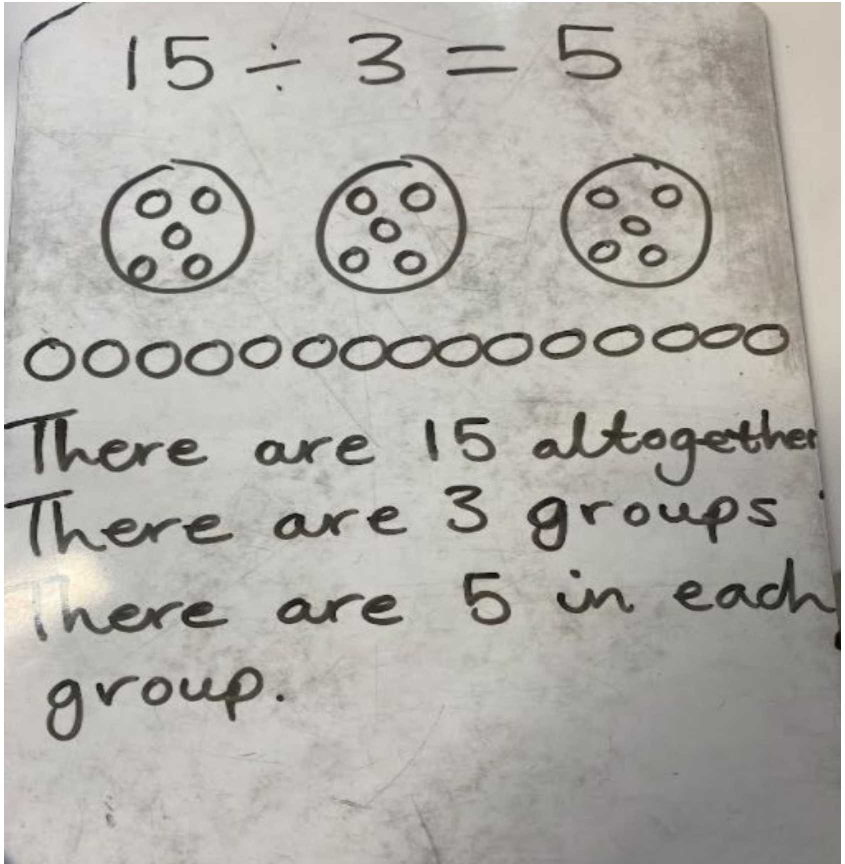
-  How many 2’s in 10?

- Understand ‘÷ 2’ as ‘half of’.
- Understand that division is not commutative.
- Recognise relationship between x and ÷
- Record using division (÷) and equals (=) signs.
- Use number lines to answer questions such as 20 ÷ 2 =

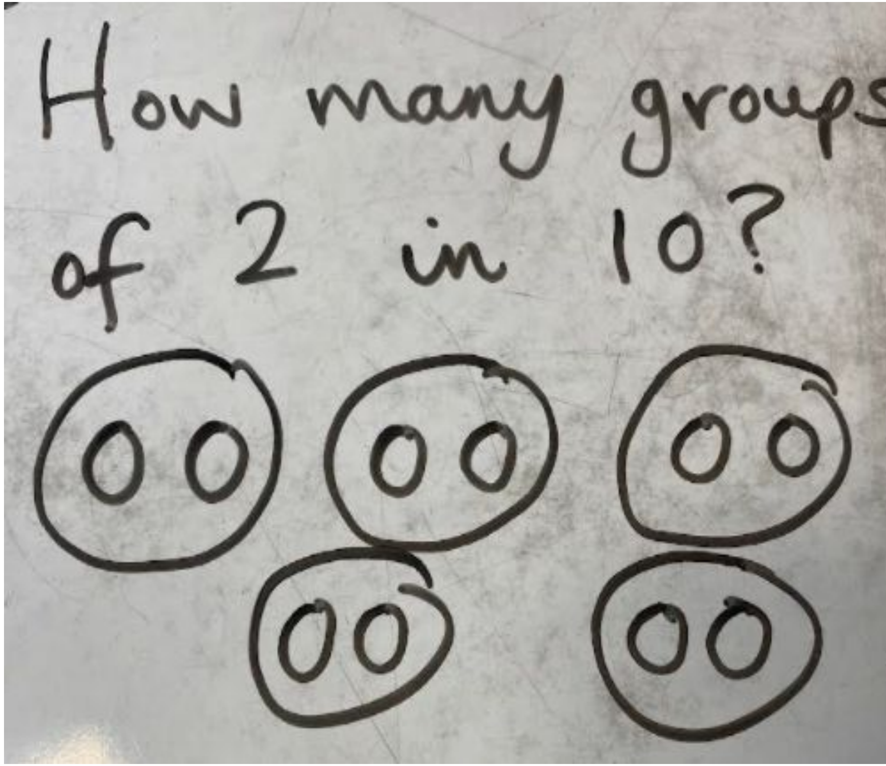


National Curriculum requirements:
Solve problems involving division using materials, mental methods and division facts.

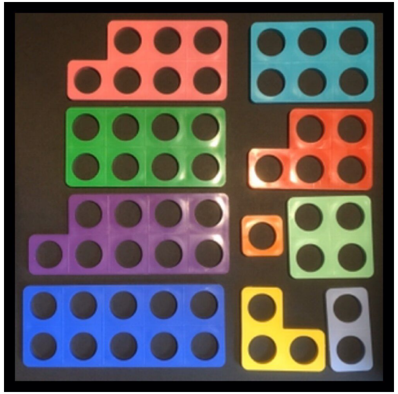
Division as sharing



Division as grouping



Manipulatives- concrete resources



Numicon

Dienes

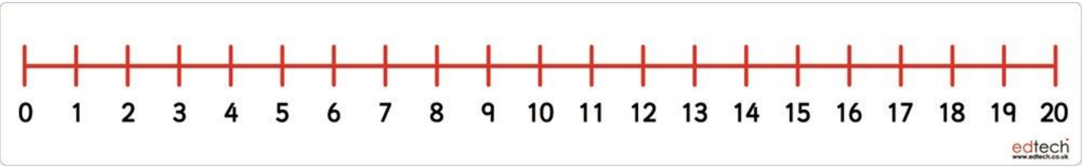
Place value counters

100 square

Number lines

Coins

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

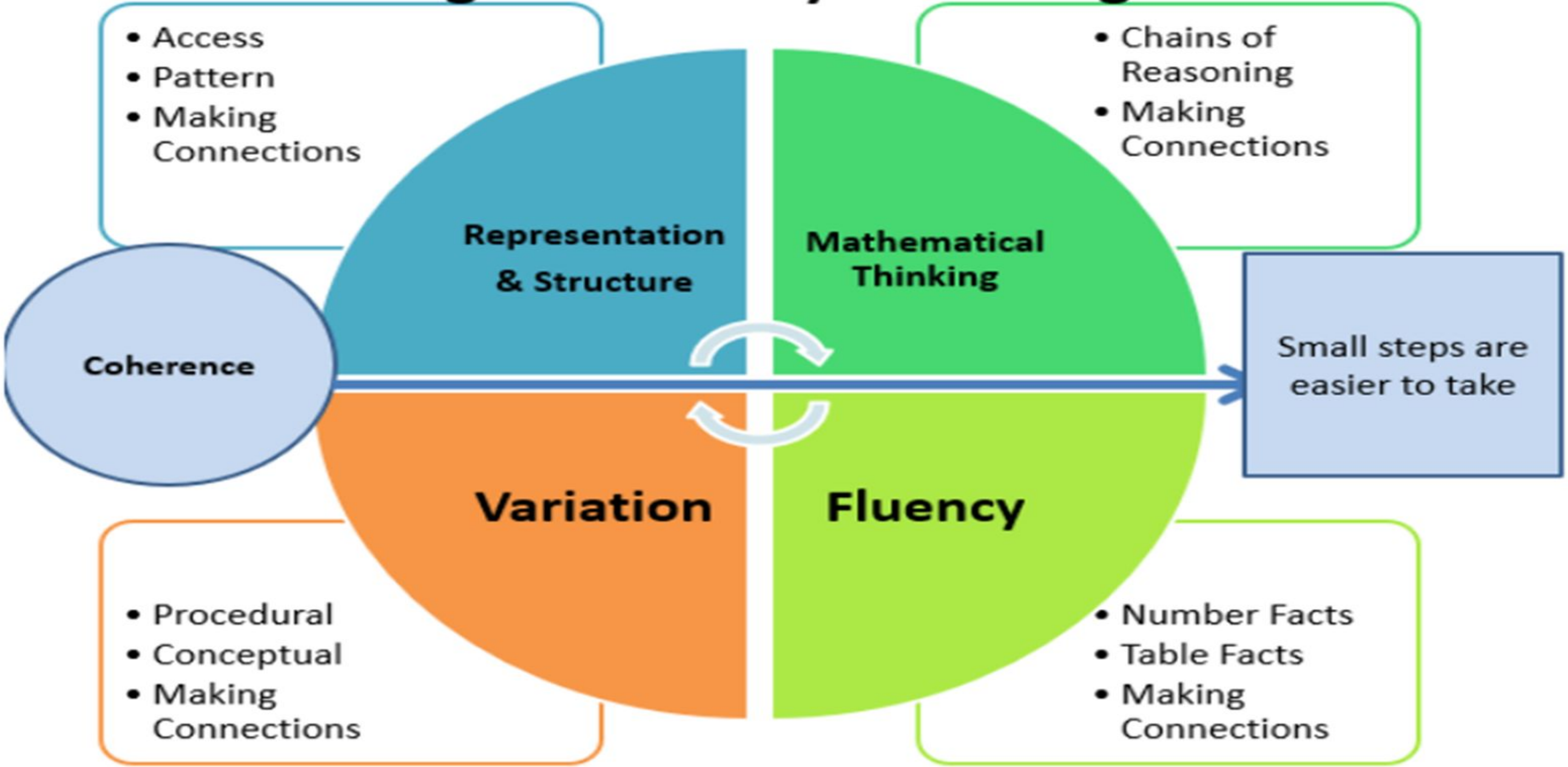


The Teaching for Mastery Approach

What does it mean to master something?

- I know how to do it
- It becomes automatic and I don't need to think about it
- I'm really good at it- painting a picture
- I can show someone else how to do it

Teaching for Mastery: The 5 Big Ideas



Making generalisations

- If you change the position of the numbers in a multiplication calculation, the answer will always stay the same.

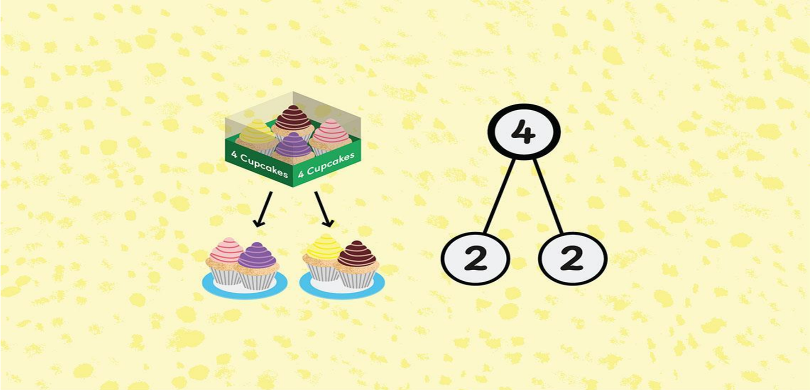
E.g. 4 x 5= 20 and 5 x 4 = 20 (commutativity)

- All even numbers end in 0, 2, 4, 6, 8

- When counting in 10s, the ones digit always stays the same but tens digit changes

Representation and Structure

- Representations are used in lessons to expose the mathematical structure being taught.
- In essence representation refers to the wide variety of ways to capture an abstract concept or relationship.



clipboard(7).

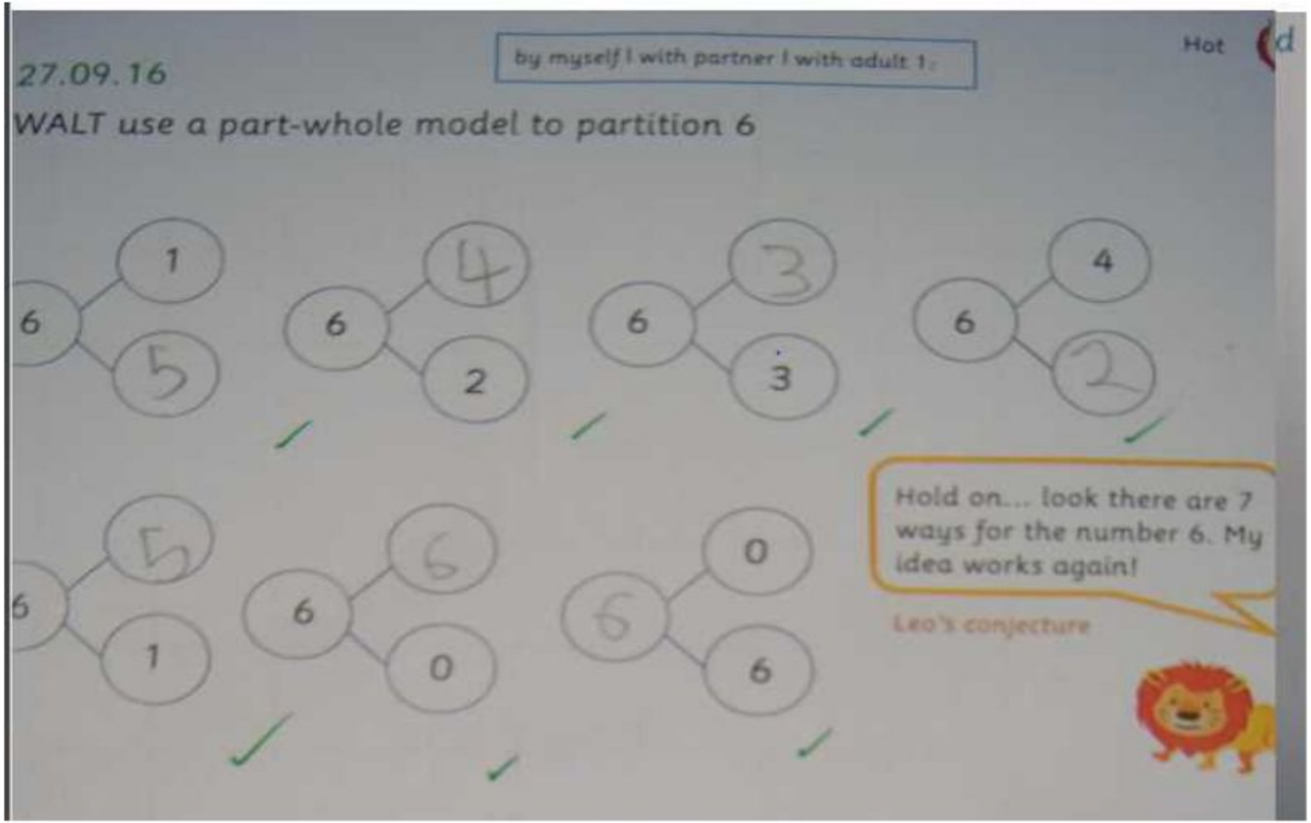
Multiple representations of the same number.

Number	Number word
47	Forty seven
Draw it	**Expanded form**
Tens / Ones 	$40 + 7 = 47$ $7 + 40 = 47$

Part part whole models

If 6 is the whole.

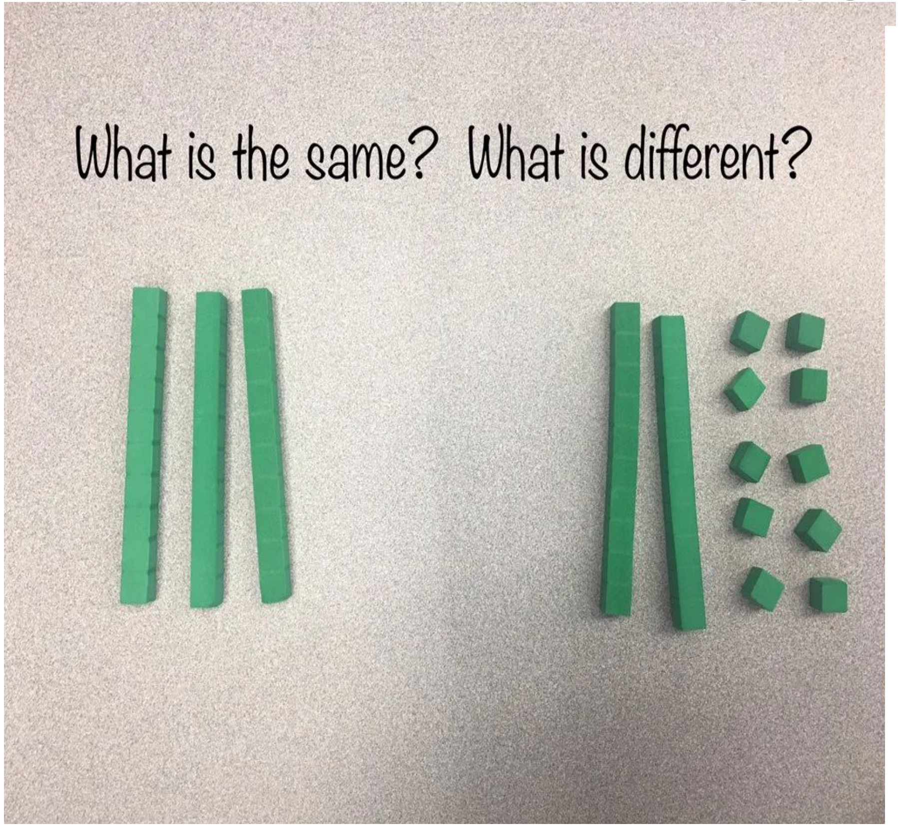
What are the parts?



Mathematical Thinking

- If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the pupil: thought about, reasoned with and discussed with others.
- We provide lots of opportunities for peer and collaborative discussions in our daily maths lessons.
- Problem solving and reasoning opportunities in every session to embed a depth of learning

Reasoning: What's the same and what's different?



What is the same?
What is different?

$$7 + 3 = 10$$

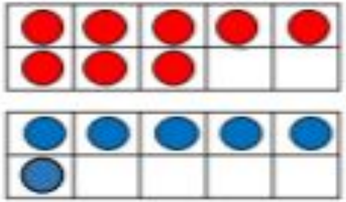
$$17 + 3 = 20$$

$$20 = 7 + 13$$

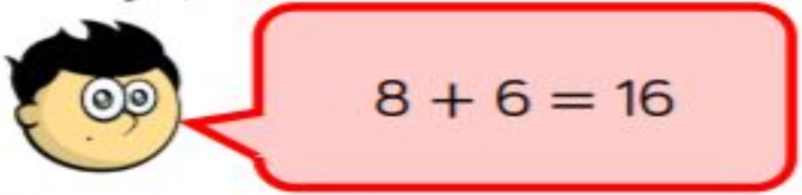
Explain your thinking.

Reasoning: Spotting mistakes and misconceptions

Dexter uses ten frames to calculate eight plus six.



He says,



Do you agree?
Explain why.

Reasoning: True or false

True or false?

12 is an odd number.

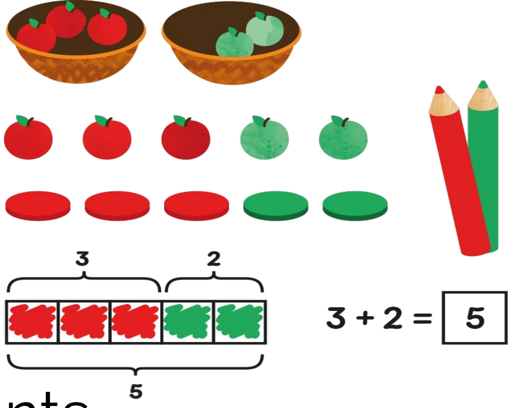
Prove your answer using concrete, pictorial and abstract representations. Explain each approach.

Fluency

- Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics.
- Hit the button- Topmarks for quick fire number fact practice
- TT Rockstars- year 2
- Number bond work- noticing the patterns, for example:

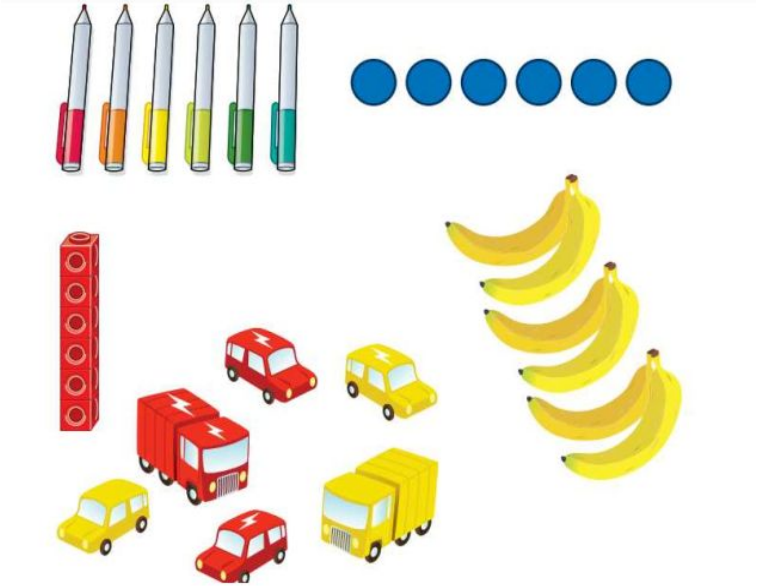
  7 + 3 = 10 so 70 + 30 = 100

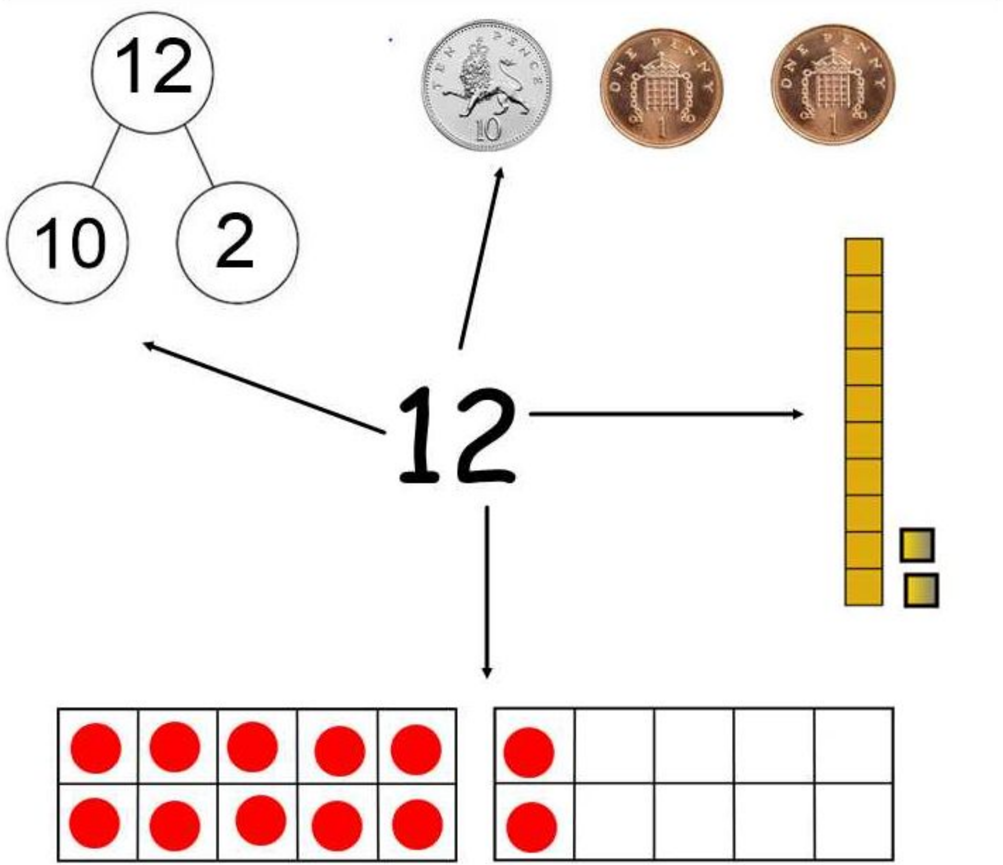
Conceptual variation



- Variation is all about how the teacher represents the concept being taught
  - Provides opportunities to work on different representations of the same mathematical idea.
  - For example, looking and multiple representations of the number 54 with dienes, place value counters, arrow cards, 100 square etc.

Variation helps visualisation





Everyone Can!

At Grange Park we encourage children to develop a **growth mindset** by using these strategies:

- It's ok to get it wrong- mistakes are valuable opportunities to re think and understand more deeply. Spotting and sharing mistakes between teachers and pupils makes learning richer.
- Praising hard work- is a great motivator by focusing on effort rather than success. Children will be more willing to try harder and take risks.
- Mind your language- the language we (teachers and parents/carers) use around learners has a profound effect on their mindsets. Make a habit of using growth phrases like 'everyone can', 'mistakes can help you learn', 'just try for a little longer' and the key of them all- 'yet'. 'I just cannot solve this yet!'

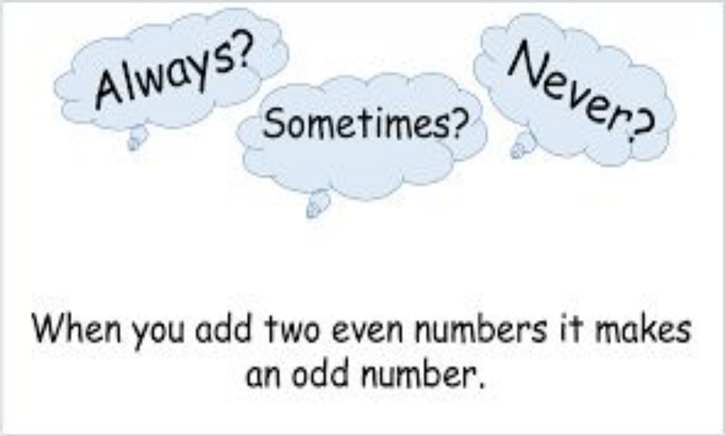
Maths Talk

- **Key Vocabulary:** Discussing essential vocabulary
- **Full sentences**: Teachers and children need to use full sentences to explain or respond. When children use complete sentences, it both reveals their understanding and embeds their knowledge.
- **Stem sentences:** These help children express mathematical concepts accurately and scaffolds their responses.

  Eg:'*4 is a part, 5 is a part, 9 is the whole.'*
- **Consistency:** all use same mathematical terms in full, i.e ones instead of units

Ways to encourage maths talk at home

- Why is that a good mistake?
- If we know this, what else do we know?
- Give me . . .tell me . . .show me . . .
- Why is this the odd one out?
- The answer is . . .what is the question?
- Give me a silly answer for . . .?
- Always, sometimes, never true?



Any questions?