KS1 Maths Parent Workshop

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Aims of the today's session:

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- 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 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

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- **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

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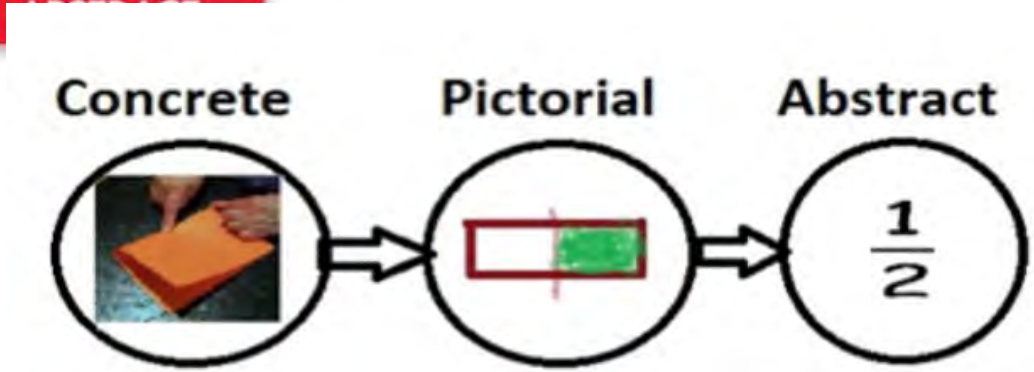
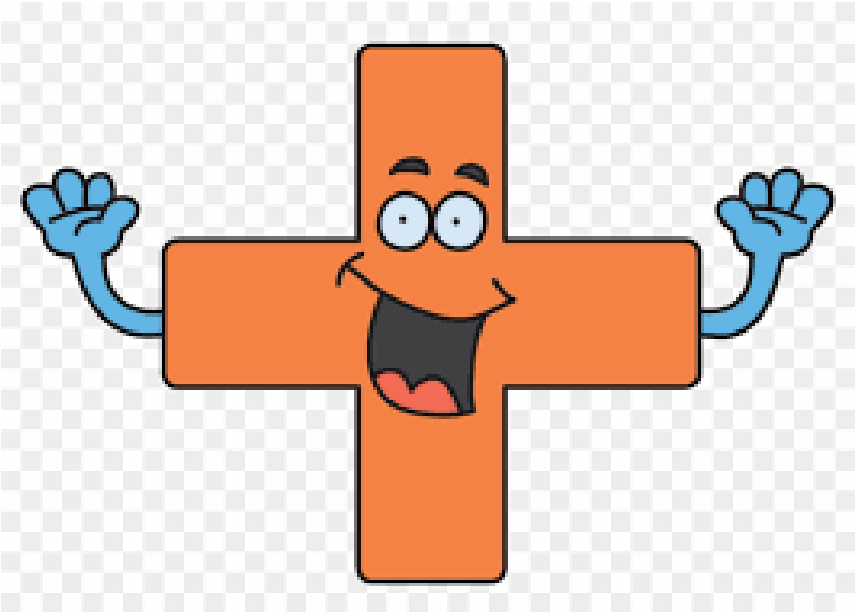
Maths should be practical for all ages and the CPA approach used at any time and with any age to support understanding



Addition in KS1



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Calculation Policy

Year 1 - Addition

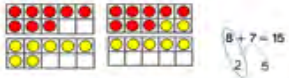
Concrete

- Use cubes (or practical equipment eg. car park example from YR)

- Feely bag addition with Numicon:

- Numicon Balance

- Use of counters and 10-frames



- Use of Concrete bar model concrete using real objects or post it notes

Discrete– use 7 strips of paper
Continuous – two different lengths of paper eg. 3 + 4

- Worded problems using concrete objects
"There are 8 cars. 2 more come long."

Pictorial

- Pictorial representation of Part Part Whole

- Bar Models (Discrete and Continuous)

- Counting on through use of number lines

Abstract

- Use of addition and equals signs to create simple number sentences

$$8 + 7 = 15$$

Oracy Sentence Stems:

____ add ____ is equal to ____

The whole is ____ The parts are ____ and ____

To find the unknown part/whole I need to ____

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

Year 2 - Addition

Concrete

- Continued use of Numicon and 10s frames

- Part Part Whole models using Base 10

- Addition of 10s using Base 10 eg 43 + 10

- Moving to exchanging across tens and hundred eg 93 + 10

- Base 10 and Cuisenaire Number Tracks for adding 10s eg 13 + 10 and 23 + 20

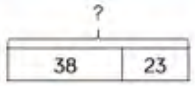
- Concrete bar models using Numicon and Base 10

Pictorial

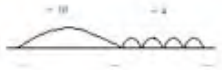
- Pictorial representations of Base 10

- Part Part Whole Models

- Bar Models (Continuous)



- Partitioning into 10s and 1s using number lines



Abstract

- Use of addition and equals signs to write number sentences of bonds up to 20 and derive fact families

eg 13 + 7 = 20
7 + 13 = 20
Link to subtraction:
20 – 7 = 13
20 – 13 = 7

- Recognise Patterns in Addition Number Sentences

Oracy Sentence Stems:

The picture tells me I need to add the numbers.

The parts are known/unknown.

The whole is known/unknown.

I can partition ____ into ____ and ____.

____ ones/tens add ____ ones/tens is equal to ____.

I will exchange one ten for ten ones.

____ add ____ is equal to ____

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- 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

Pictorial representations using base 10

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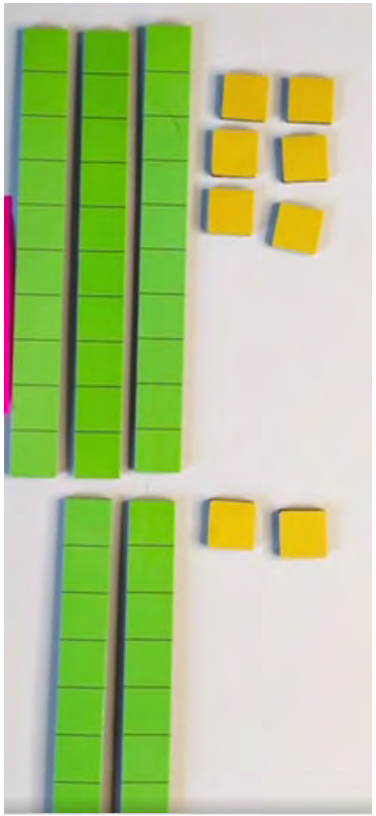
36 + 22

Can the children read the number 36 and represent it?

Can the children partition the number into tens and ones?



The same calculation representation using place value counters

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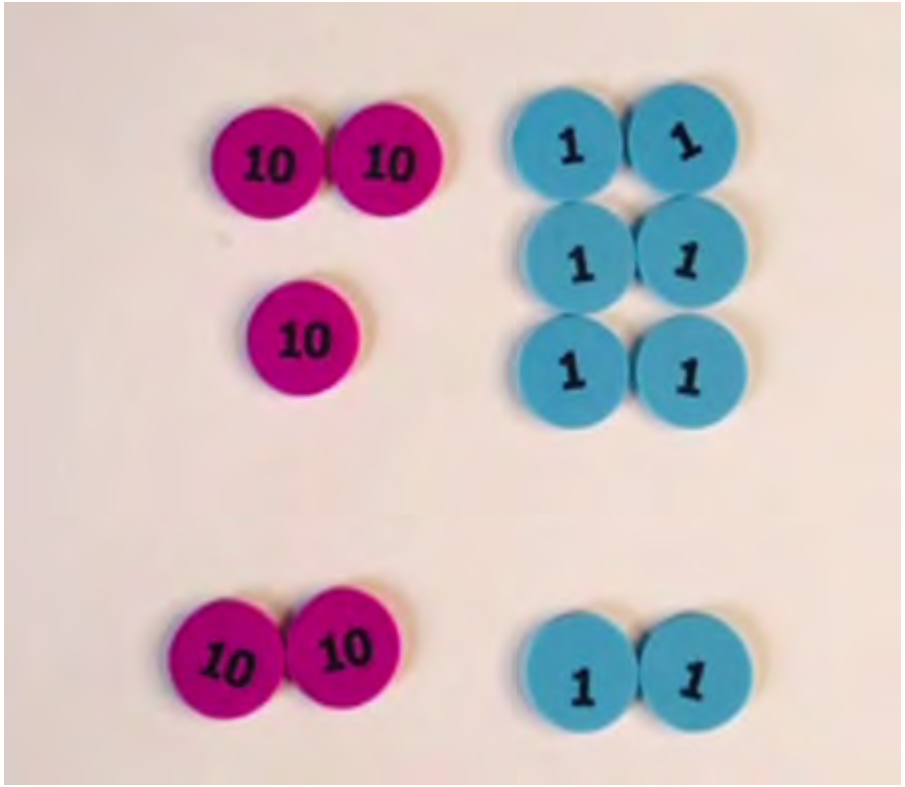
36 + 22

Can the children read the number

36 and represent it?

Can the children partition the number

into tens and ones?



Number line addition - counting on

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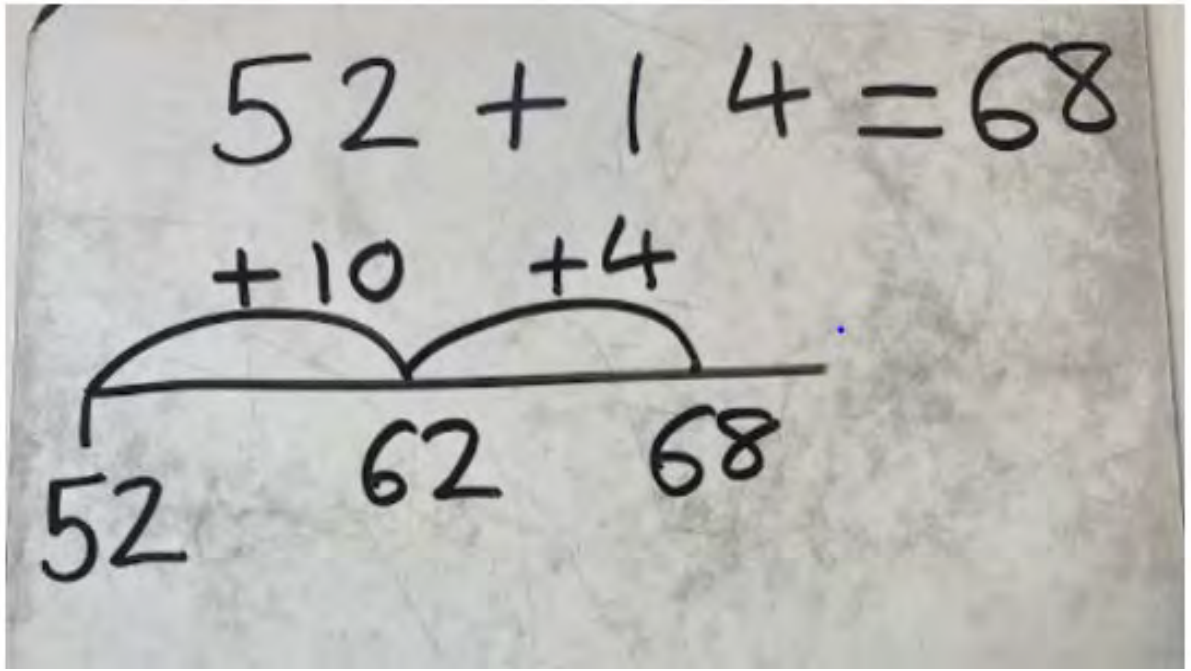

Subtraction in KS1

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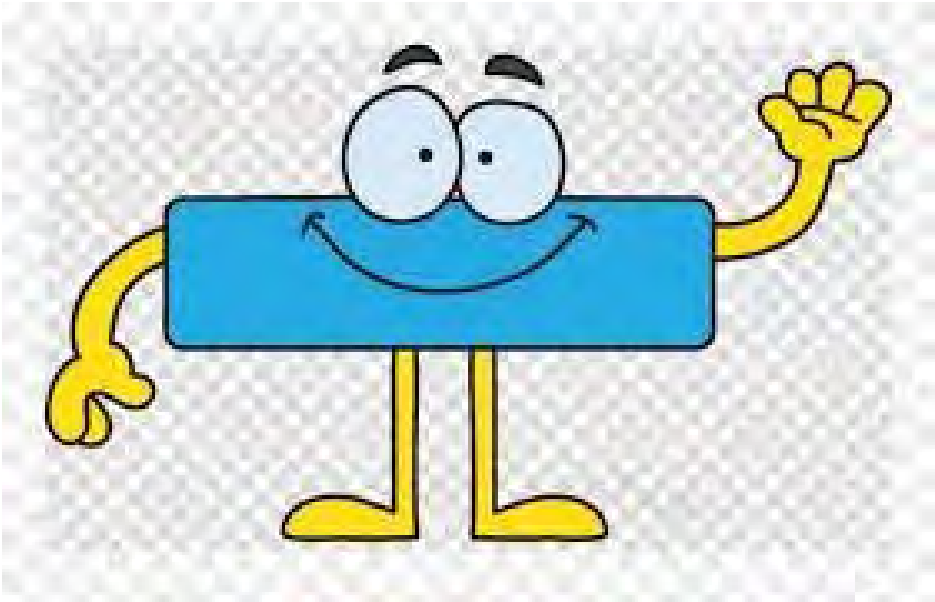
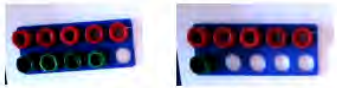


Year 1 - Subtraction

Concrete

- Squash Numicon into playdough and cut parts off – what's left? (see EYFS subtraction)
- Numicon and objects
  eg. 6 – 2

eg. 9 – 3 = 6



- 5 frames
- Progressing to 10 frames

(Both Five–wise and Pair-wise)

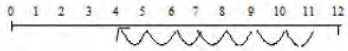
- Chalk out number lines to count back on physically

- Number tracks

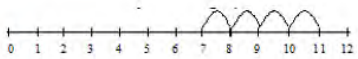
- Concrete Bar Models using real life objects (Comparison)

Pictorial

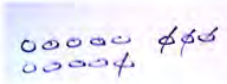
- Drawing jumps on prepared number lines eg. 11 - 7



- Find difference by counting up number lines



- Pictorial representations of objects crossed out



- Drawn Bar modelling from concrete objects (discrete)

- Provide children with squares with pictures of objects onto glue and stick discrete bar models and then cross out

Abstract

- Use of fingers
  eg. Put 13 in your head, count back 4. What number are you at?
- Number sentences using – and =
- Subtract multiples of 10 eg. 50 – 20 = 30
- Relationships/Related facts (Summer Term)

Relationships/ Related Facts

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

Oracy Sentence Stems:

____subtract____ is equal to____

When we subtract, we start with the whole

The whole is ____. The parts are ____ and ____

To find the unknown part/whole I need to____

The difference between ____and____is ____

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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

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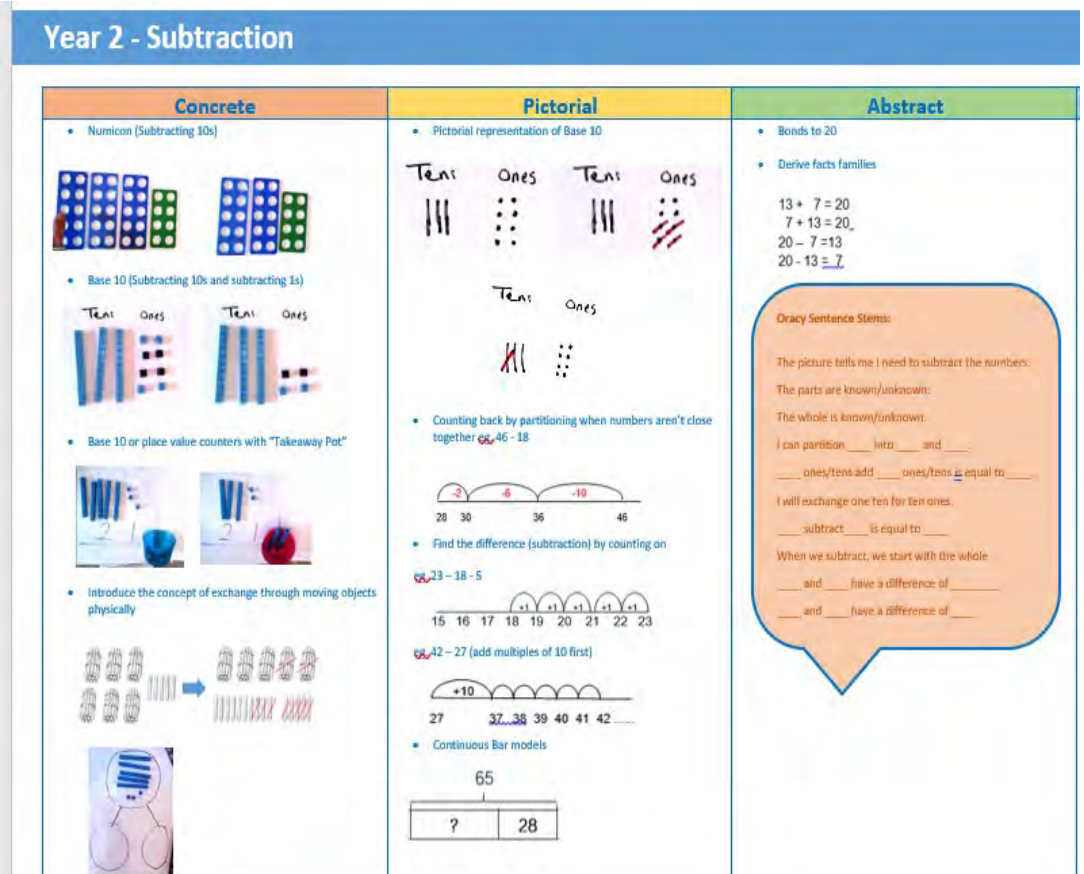
- Partitioning the second number
- Count back the ones.
- Count back the tens.
- Find the difference by counting up.
- Recognise the inverse relationship between + and -



Subtraction with concrete resources

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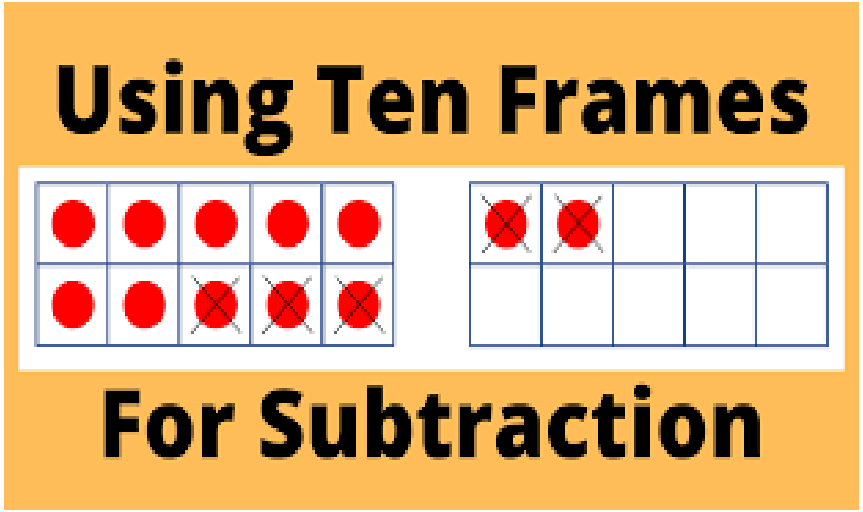
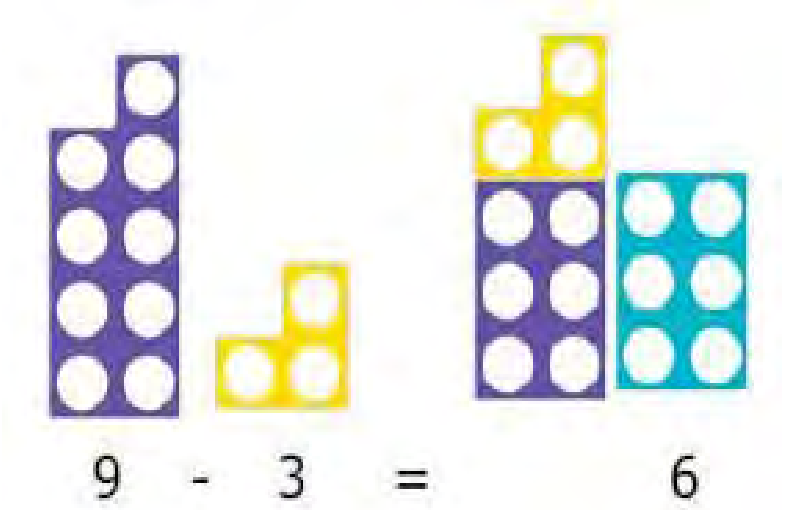
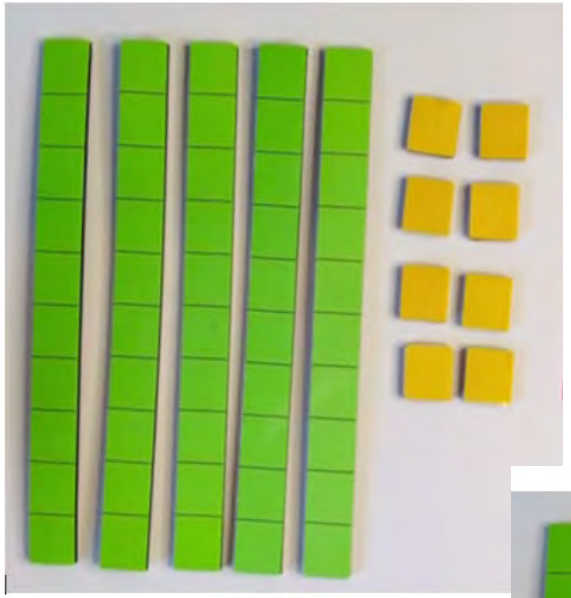
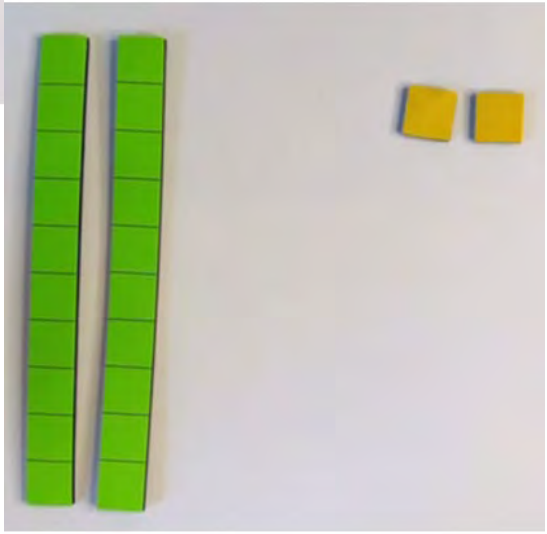




No exchange

58- 36





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!

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Counting back using partitioning

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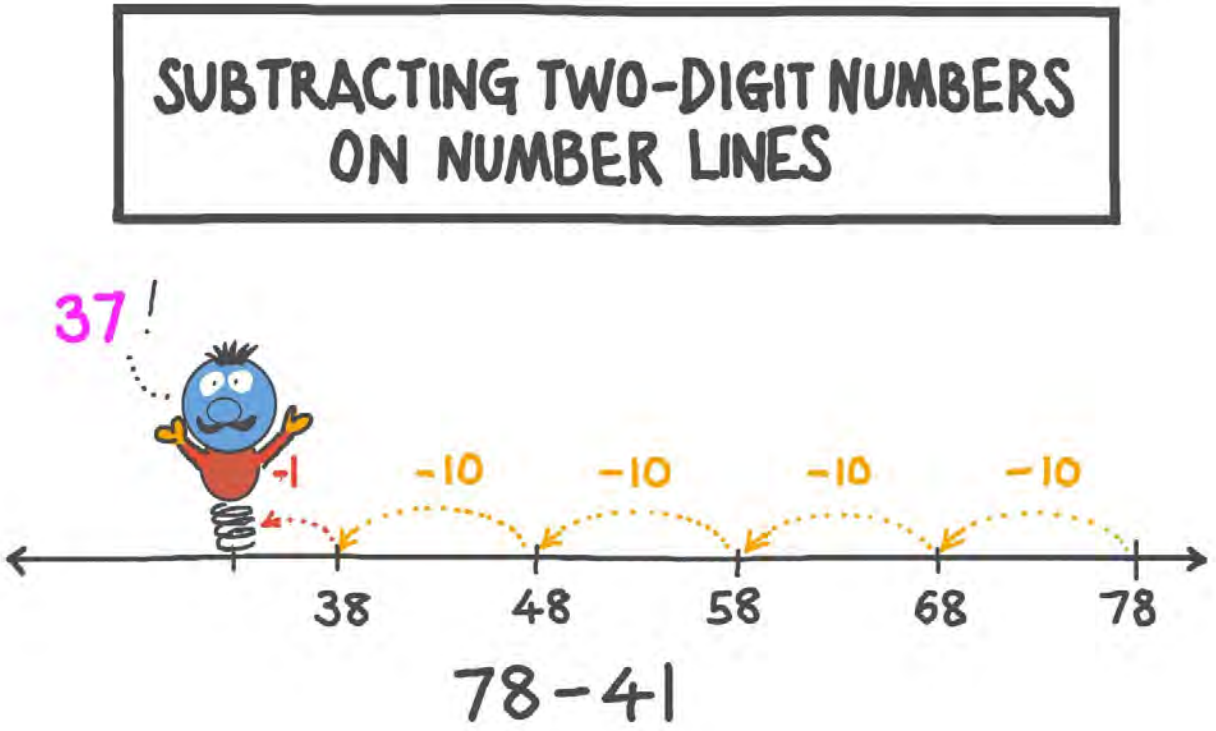

Finding the difference using a number line - counting up

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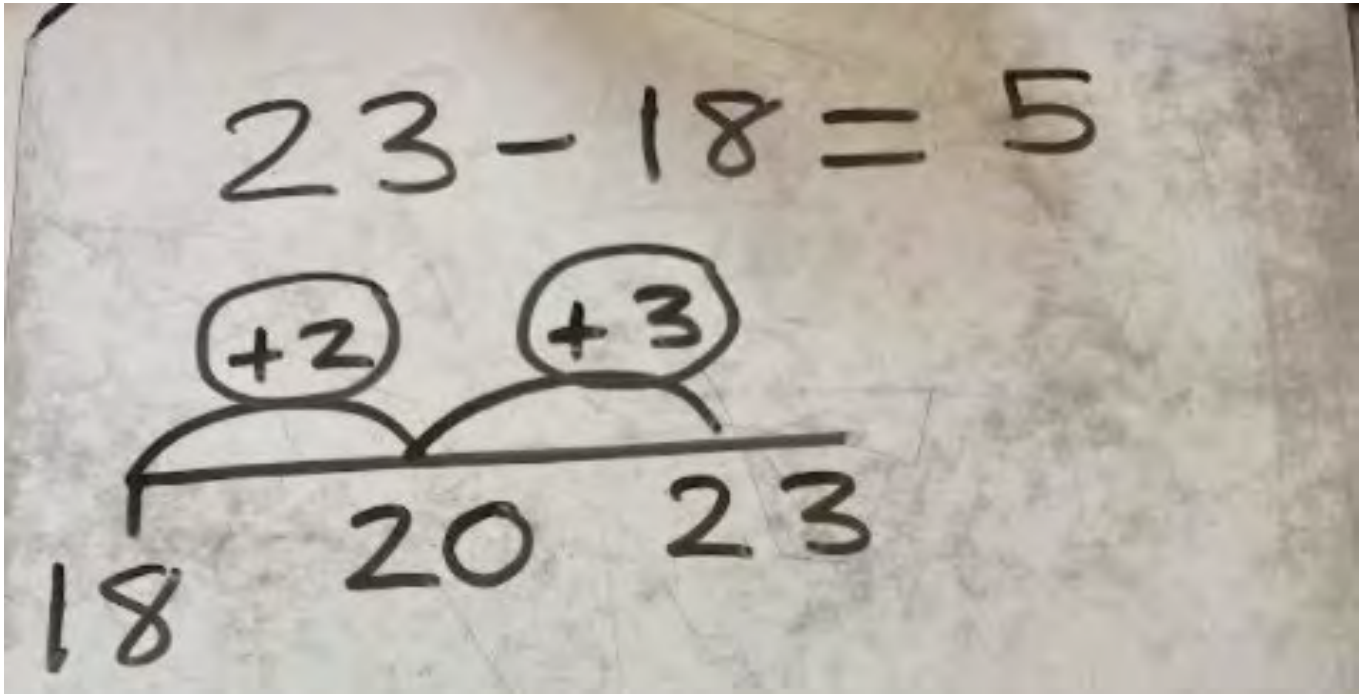
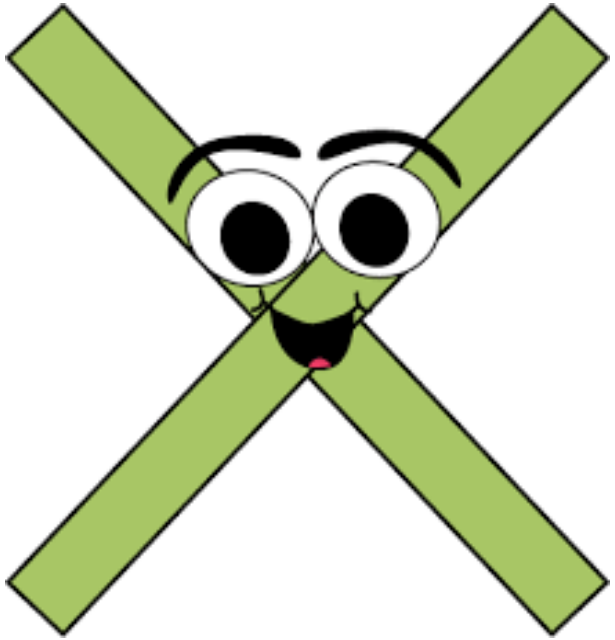


Multiplication in KS1



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2's, 5's and 10's;

spotting the pattern using

manipulatives such as

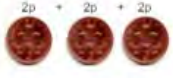
numicon, number lines and coins.

Year 1 – Multiplication

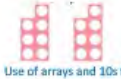
Concrete

- Use different objects to add equal groups

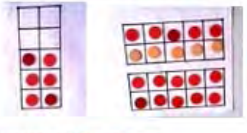
- Counting in multiples of 2p, 5p and 10ps



- Numicon Doubles up to 10 + 10



- Use of arrays and 10s frame to count in multiples of 2s, 5s and 10s



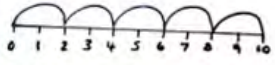
- Jumping on chalk number lines

Pictorial

- Pictorial representation of groups of concrete objects

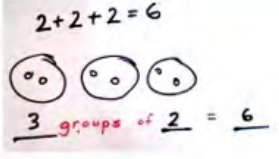
There are 2 sweets in one bag. How many sweets are there in 5 bags?

- Use of number lines



Abstract

- Repeated addition sentences of concrete objects and pictures



Oracy Sentence Stems:

____ groups of____ are equal to____

The pattern is increasing in ____

There are____ groups of ten. There are ____ ones.

____groups of ten are equal to____

____groups of two are equal to____

____groups of five are equal to____

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

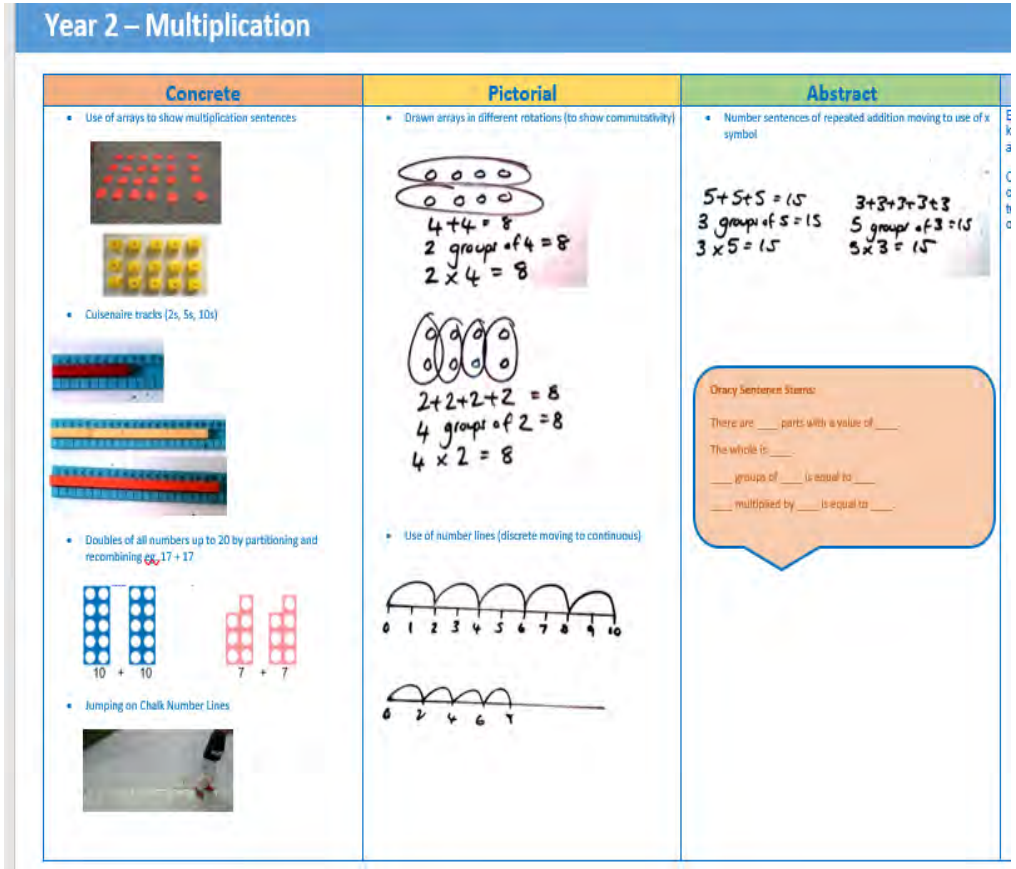
Repeated addition.

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)



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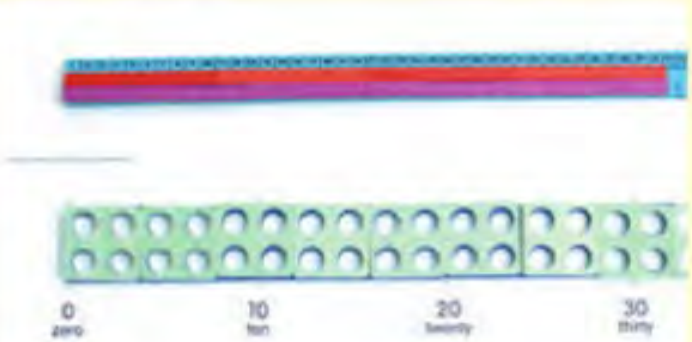
Understanding multiplication

Counting in groups of...



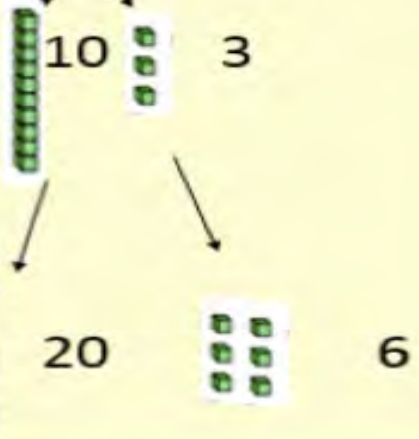
Spotting patterns

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

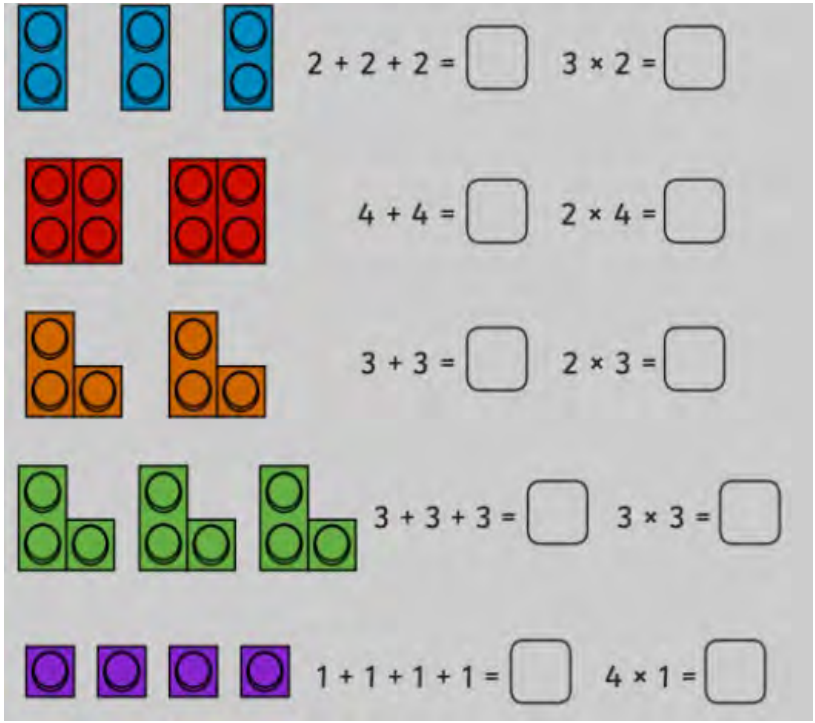
Doubling (and halving!)

3 + 3 = 3 X 2

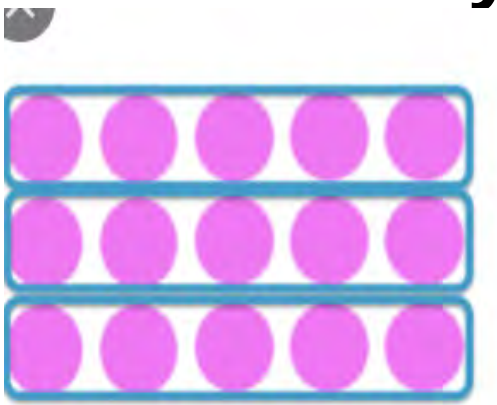
13 X 2 =



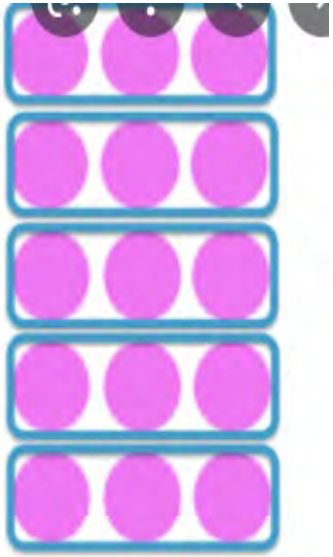
Repeated addition



Arrays



3 x 5 = 15



5 x 3 = 15

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Division in KS1

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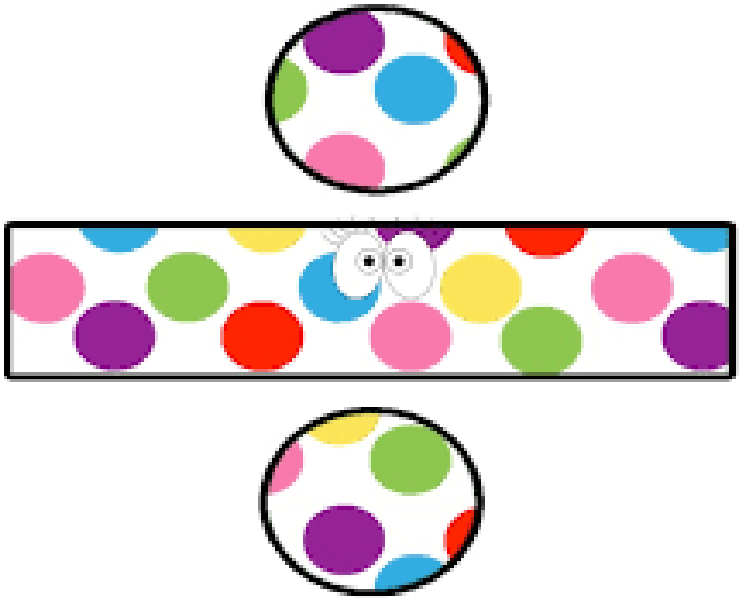

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Division as sharing through practical activities.

Halving even numbers up to 10

Not introduced to the ÷ symbol unti year 2

Year 1 – Division

Concrete

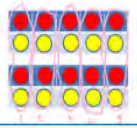
- Sharing/Halving even numbers between 2 up to 10 and 20 using concrete objects

- Sharing equally using concrete objects eg. There are 3 bowls and 9 bananas, how many bananas are there in each bowl?

- Sharing concrete objects using concrete bar models

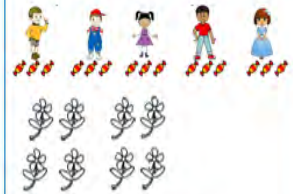
- Moving to grouping eg. How many groups of 2 in 6? Eg. How many groups of 5s in 10?

- Use of 10 frames to group eg. How many groups of 4 in 20?



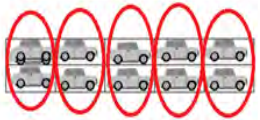
Pictorial

- Use of pictures or shapes to share quantities



- Use of bar models to share equally

- Use of 10 frames and pictures in 10 frames to group



Abstract

- Understanding ÷2 as half
- Understanding division as the inverse of multiplication
- Divide 10 in 5 groups. How many in each group?
- Abstract bar models

Oracy Sentence Stems:

____ shared into ____ equal parts ____ is ____.

____ shared equally into groups of ____ makes ____ groups.

I shared ____ into ____ equal groups. There are ____ in each group.

The pattern is increasing in ____

The pattern is decreasing in ____

There are ____ groups of ten. There are ____ ones

There will be ____ in each group.

Guidance

As with EYFS, division should be taught first through the concept of **sharing** amounts equally and then progressing to **grouping** objects.

Make use of sharing and groups in illustrations

eg. Beans in Jack and the Bean Stalk, Food in Teddy Bear's Picnic

See NC objectives for fractions.

Recalling division facts for 2,5 and 10 times tables

Division as sharing and grouping.

Understanding ÷ 2 as 'half of'

Recognise relationship between X and

Year 2 – Division

Concrete

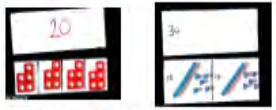
- Share out quantities into equal groups using cubes, counters and other objects.

- Use of Numicon and Base 10 for halving numbers (sharing)

- Use of Numicon for grouping. How many groups of 5 in 20?

- Use of contextual questions: 20 children going on a school trip. Each car holds 5 people; how many cars are needed?
- Use of arrays. Eg. There are 20 cabbages and they are put into rows of 5. How many rows are there?

- Concrete Bar Models to represent division



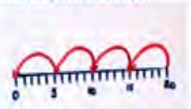
- Use of Cuisenaire number tracks eg. 15 ÷ 5

Pictorial

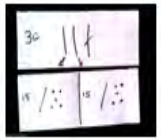
- Grouping

- Use number tracks/lines for questions eg. How many 2s in 10?

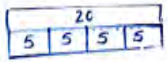
"How many 5s are there in 20?"



- Pictorial representations of bar models



- Bar models (continuous)



Abstract

- Understand '÷ 2' as 'half of'.
- Understand that '÷ 4' as 'quarter of'.
- Understand that division is not commutative.
- Recognise relationship between x and ÷
- Record using division (÷) and equals (=) signs.
- Divide 10 into 5 groups. How many are in
- each group?

Oracy Sentence Stems:

___ shared into ___ equal parts ___ is ___

___ divided by ___ is equal to ___

We exchange 1 ten for 10 ones.

When we divide, the whole is known and the number or parts or the value of the parts is unknown

___ divided by ___ is equal to ___

Guidance

Division should be taught first through the concept of **sharing** amounts equally and then progressing to **grouping** objects.

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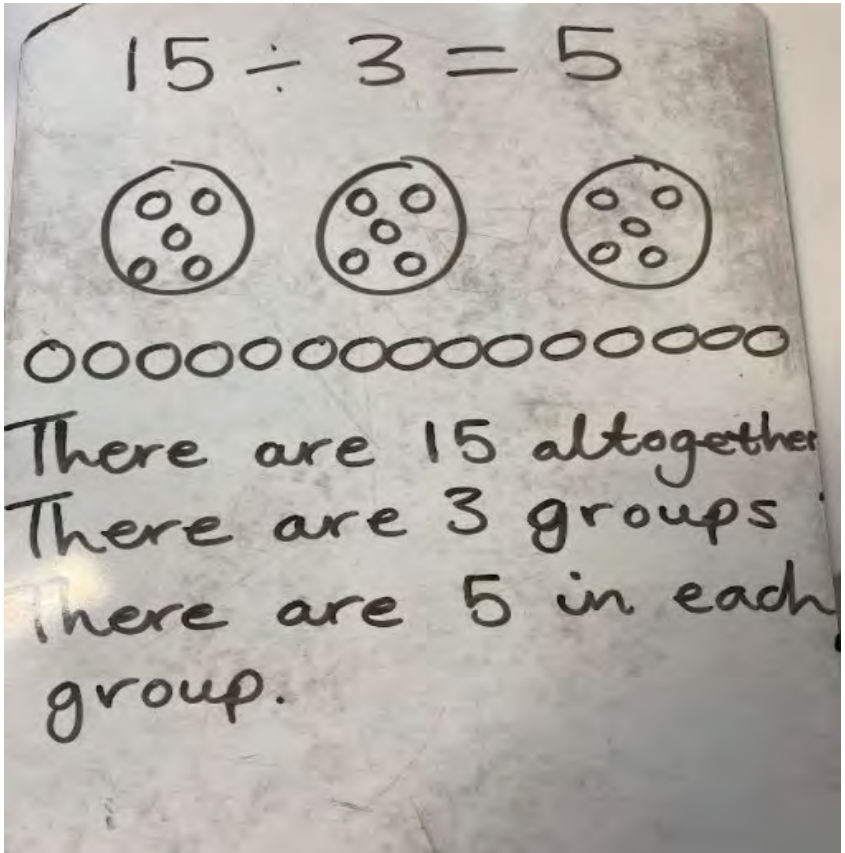
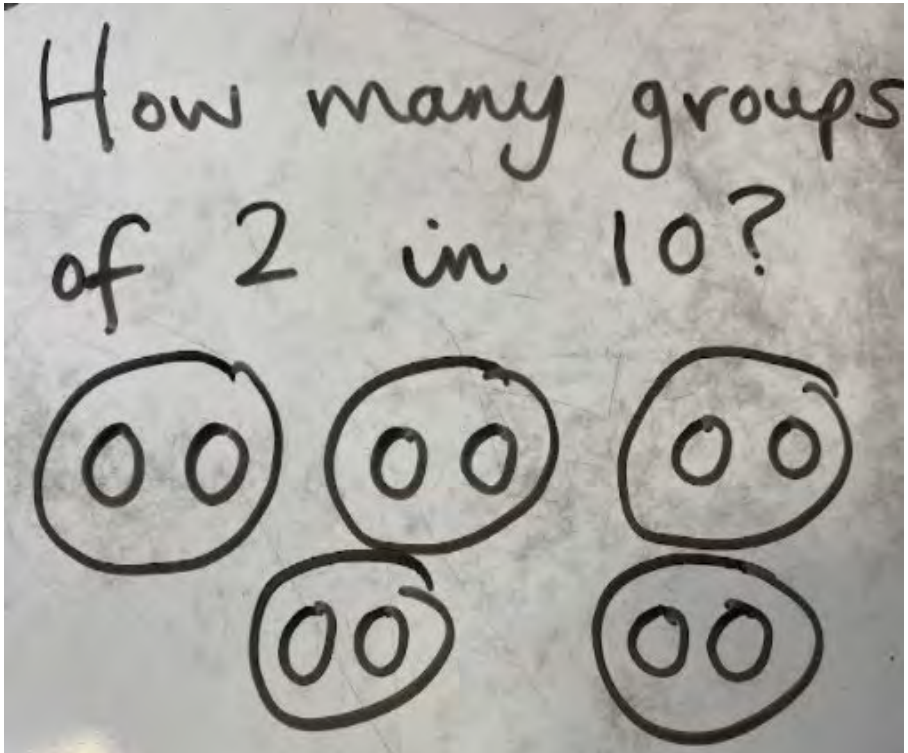
Division as sharing



Division as grouping



Manipulatives - concrete resources

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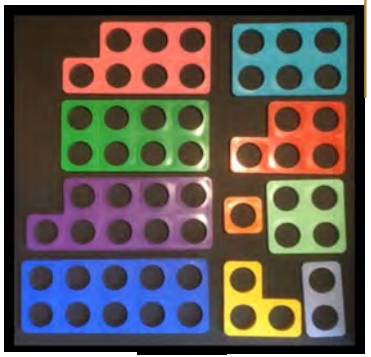


Numicon

Dienes

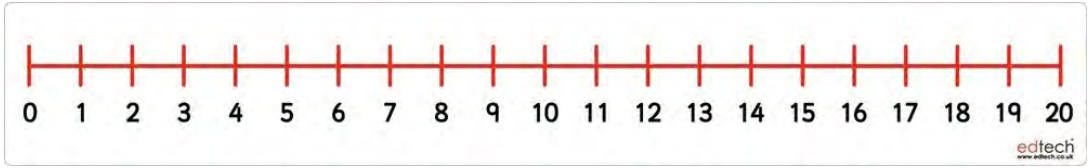
Place value counters

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

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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

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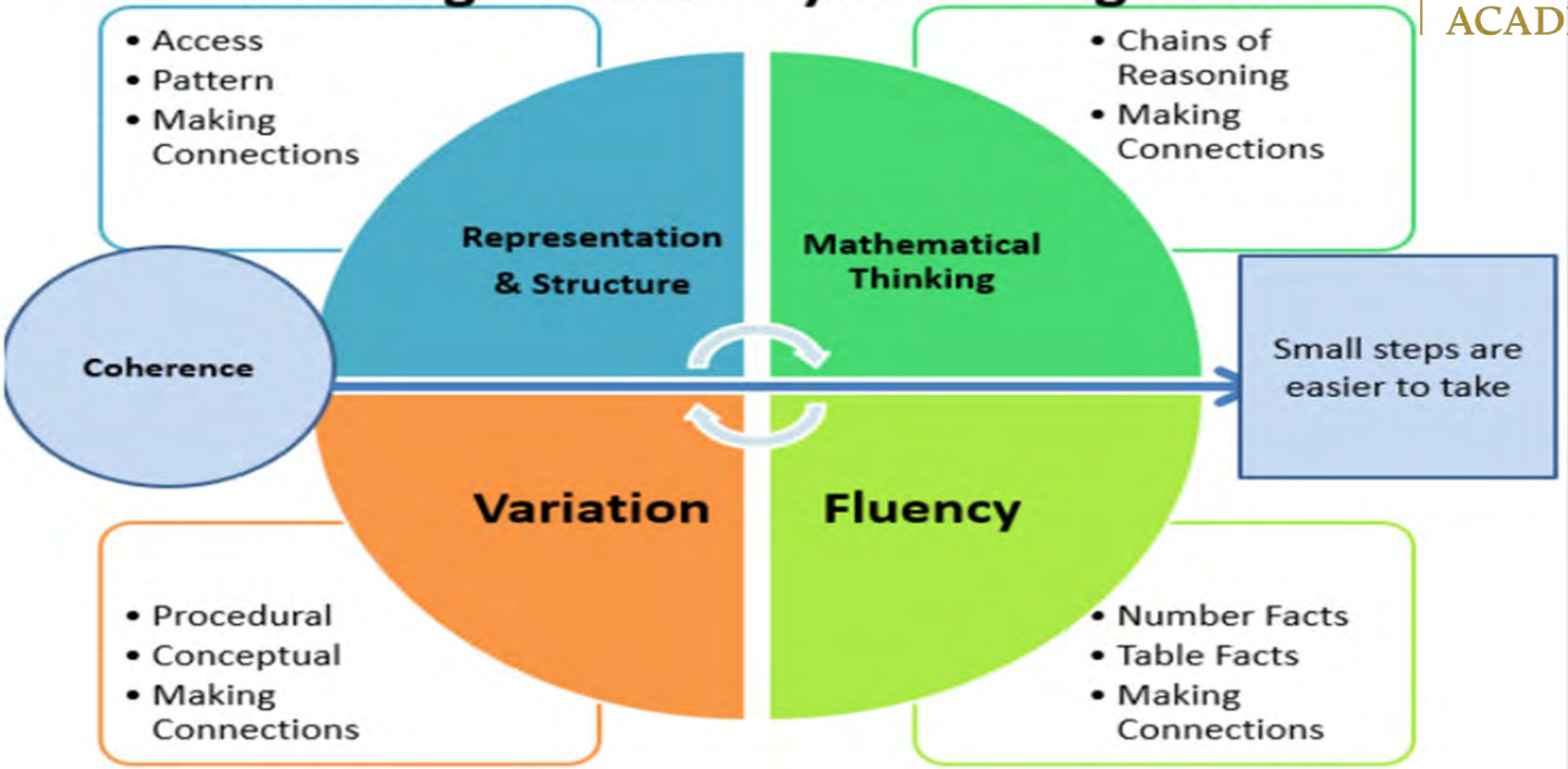
Teaching for Mastery: The 5 Big Ideas



Making generalisations

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- 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

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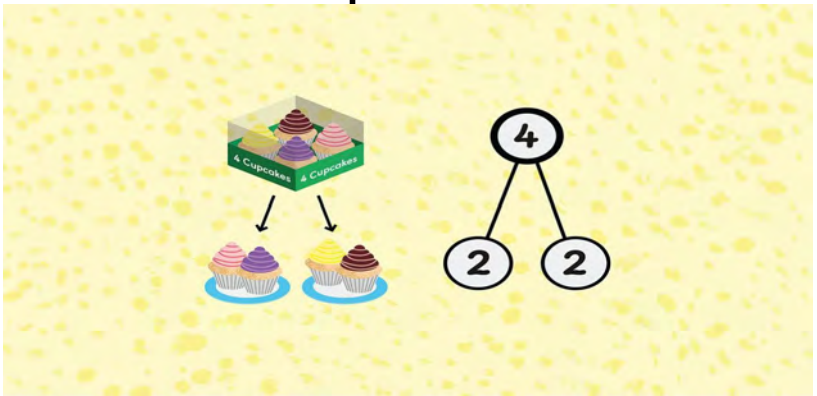
- Representations are used in lessons to expose the mathematical structure being taught.
- In essence representation refers to the wide variety of ways to capture an abstract concept or relationship.



clipboard(7).

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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

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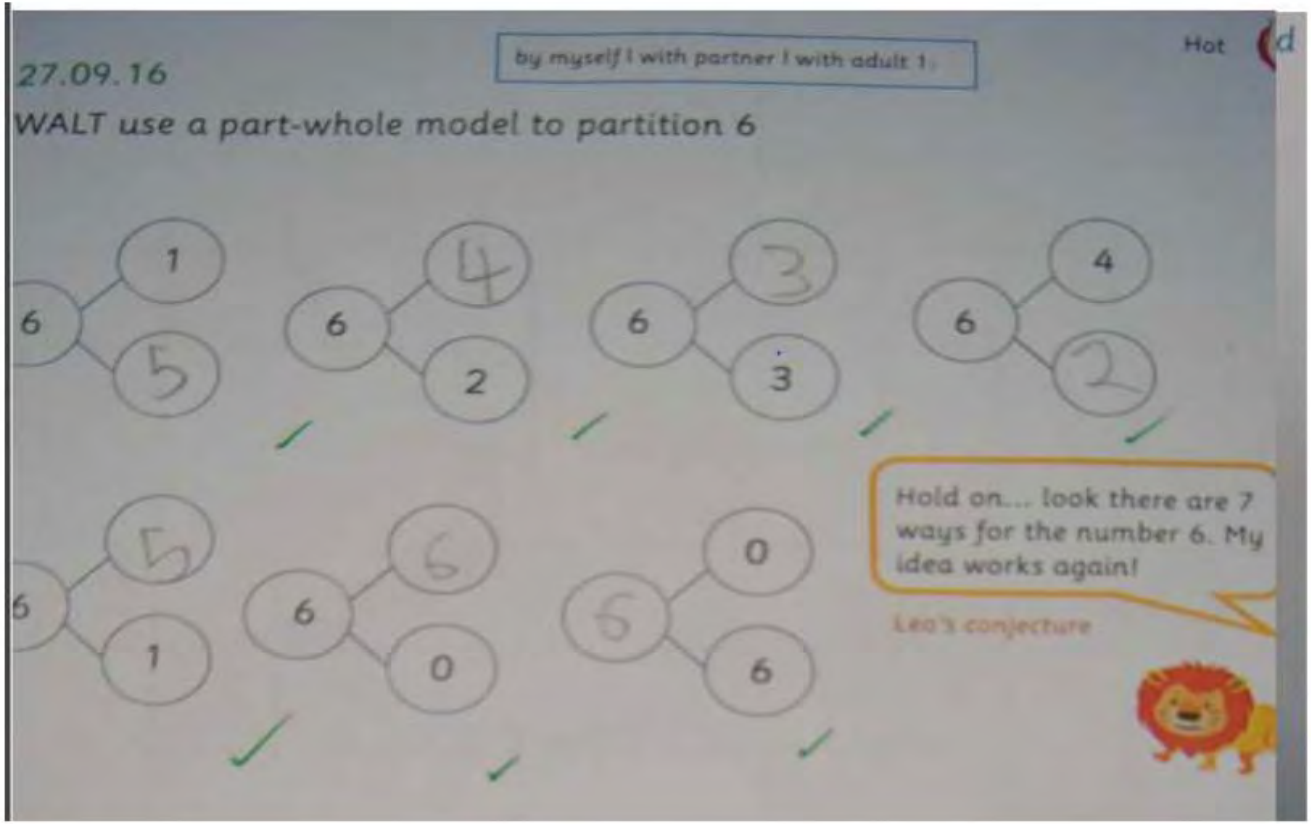
If 6 is the whole.

What are the parts?



Mathematical Thinking

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- 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?

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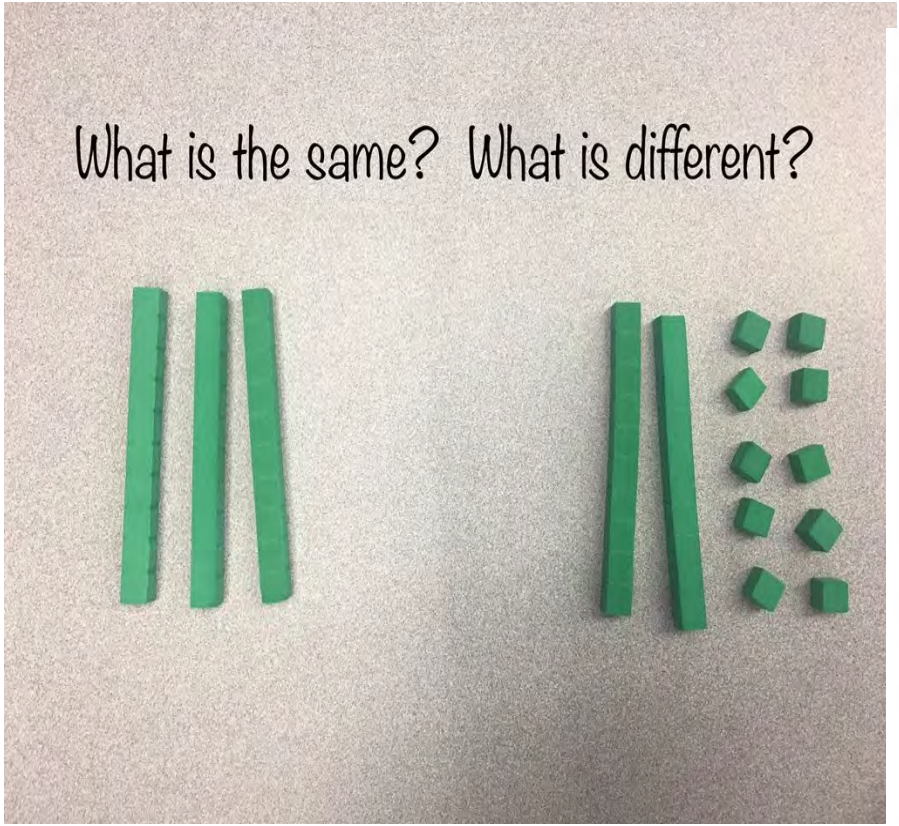


What is the same?
What is different?

$$7 + 3 = 10$$

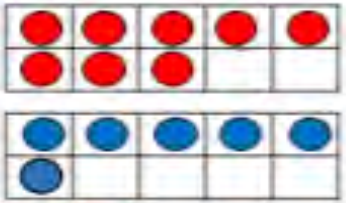
$$17 + 3 = 20$$

$$20 = 7 + 13$$

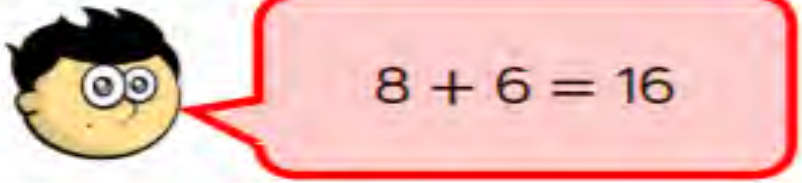
Explain your thinking.

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

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True or false?

12 is an odd number.

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

Fluency

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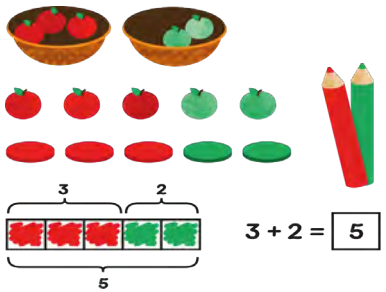
- Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics.
- Hit the button - Topmarks for quick fire number fact practice
- TT Rockstars- year 2
- Number bond work - noticing the patterns, for example: 7 + 3 = 10 so 70 + 30 = 100

Conceptual variation



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- 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

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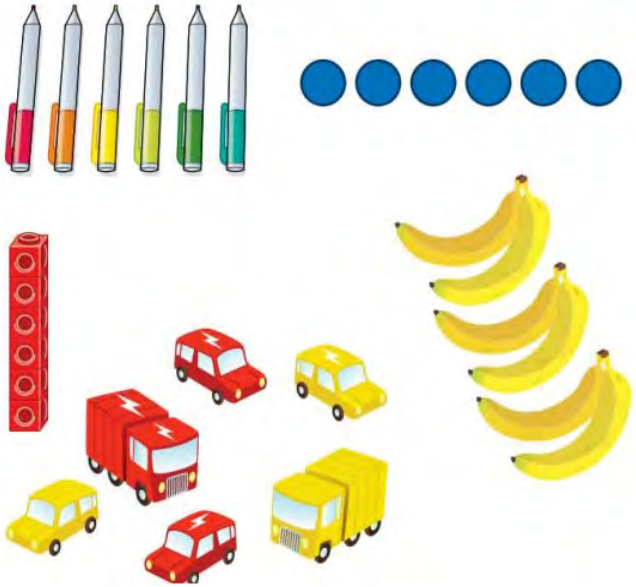

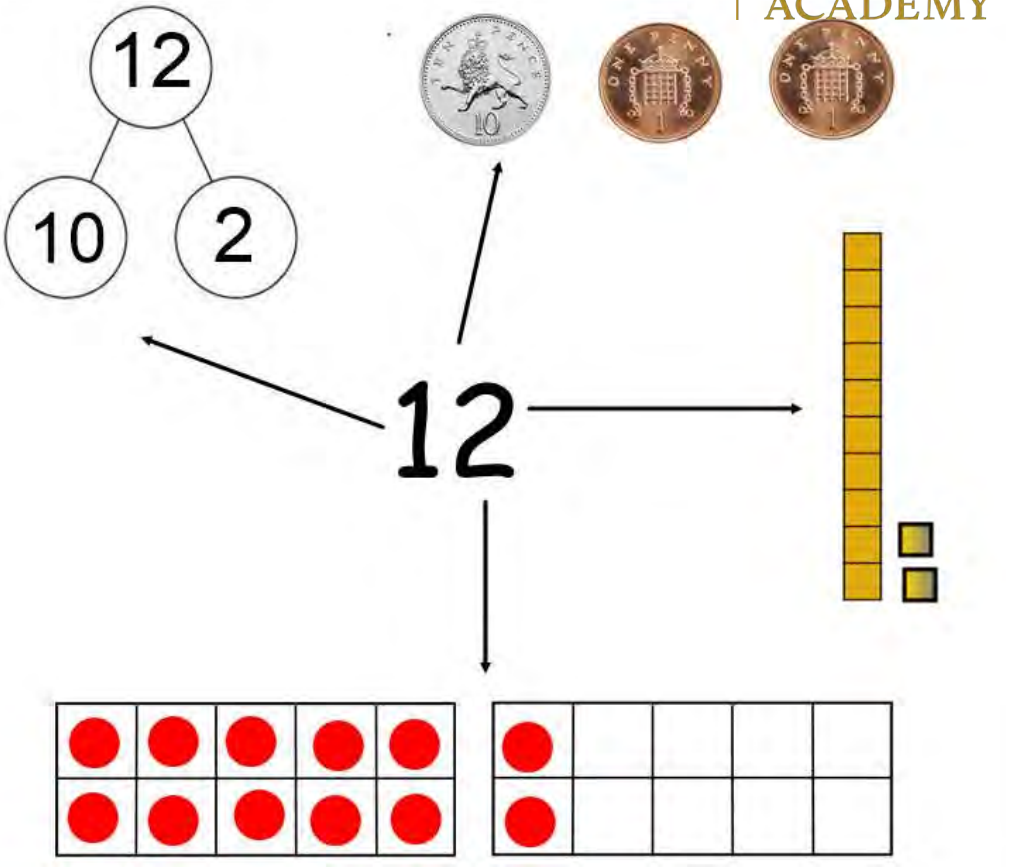

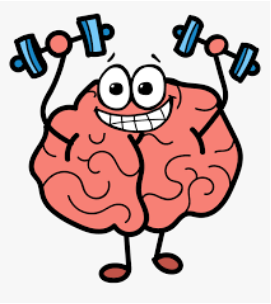

Everyone Can!

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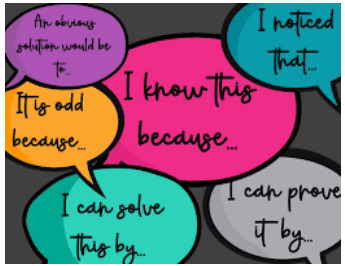
At Enfield Heights we encourage children to develop a **growth mindset** by using these strategies:

- 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



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- **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

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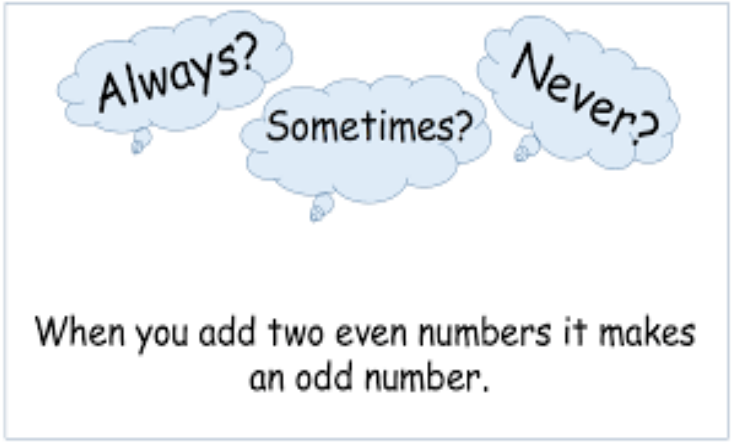
- Why is that a good mistake?
- If we know this, what else do we know?
- Give me . . .tell me . . .show me . . .
- Why is this the odd one out?
- The answer is . . .what is the question?
- Give me a silly answer for . . .?
- Always, sometimes, never true?



Any questions?

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