Year 3 & 4 Maths Parent Workshop

Led by Elena Yiapanis

Deputy Headteacher and Maths Subject Lead

Enfield Heights ACADEMY

Aims of the today's session:

Enfield Heights ACADEMY

- 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

Enfield Heights ACADEMY

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

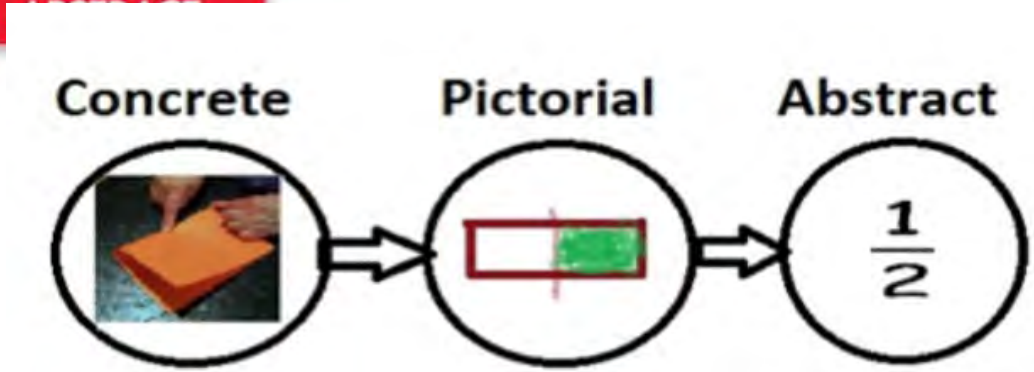
- **Pictorial** : 'seeing the maths' - making connections between the concrete and the pictorial representations and the pictorial and the abstact . Eg: part whole models, bar models, ten frames.

- **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

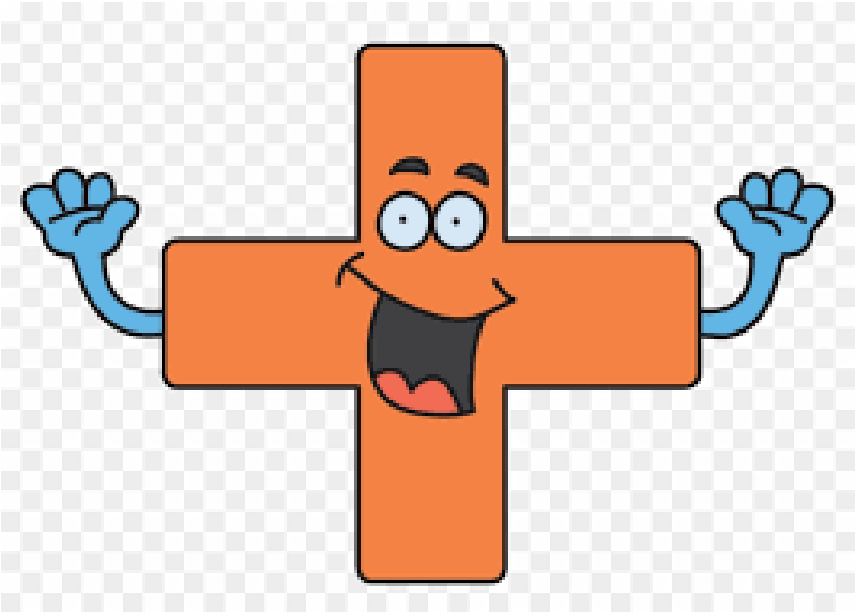
Enfield Heights ACADEMY

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



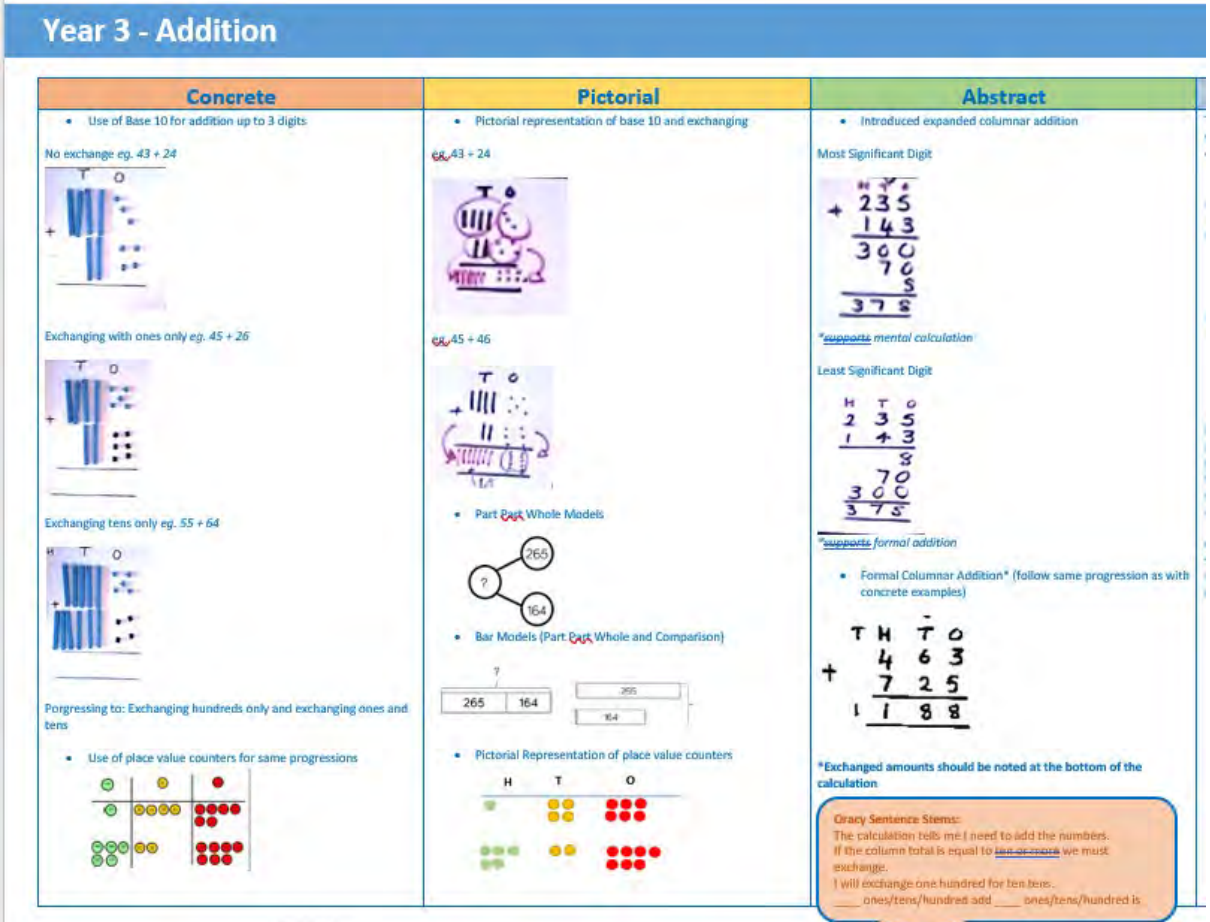
Addition in Year 3 & 4

Enfield Heights ACADEMY



Calculation policy

Enfield Heights ACADEMY



Year 3 - Addition

Concrete

- Use of Base 10 for addition up to 3 digits

No exchange *eg. 43 + 24*

Exchanging with ones only *eg. 45 + 26*

Exchanging tens only *eg. 55 + 64*

Porgressing to: Exchanging hundreds only and exchanging ones and tens

- Use of place value counters for same progressions

Pictorial

- Pictorial representation of base 10 and exchanging

43 + 24

45 + 46

- Part Part Whole Models

265 ? 164

- Bar Models (Part Part Whole and Comparison)

265 164 ?

- Pictorial Representation of place value counters

H T O

Abstract

- Introduced expanded columnar addition

Most Significant Digit

235 + 143 = 300 + 70 + 8 = 378

*supports mental calculation

Least Significant Digit

235 + 143 = 8 + 70 + 300 = 378

*supports formal addition

- Formal Columnar Addition* (follow same progression as with concrete examples)

463 + 725 = 1188

*Exchanged amounts should be noted at the bottom of the calculation

Oracy Sentence Stems:
The calculation tells me I need to add the numbers.
If the column total is equal to ten or more we must exchange.
I will exchange one hundred for ten tens.
____ ones/tens/hundreds add ____ ones/tens/hundred is

Addition of 3 digit numbers

Alongside the manipulatives (for understanding) you will notice we add one column at a time.

First the ones say it then record it.

Then the tens say it then record it.

Then the hundreds say it then record it.

Only towards the end of year 3 do we move towards the compact method - secure in their understanding.

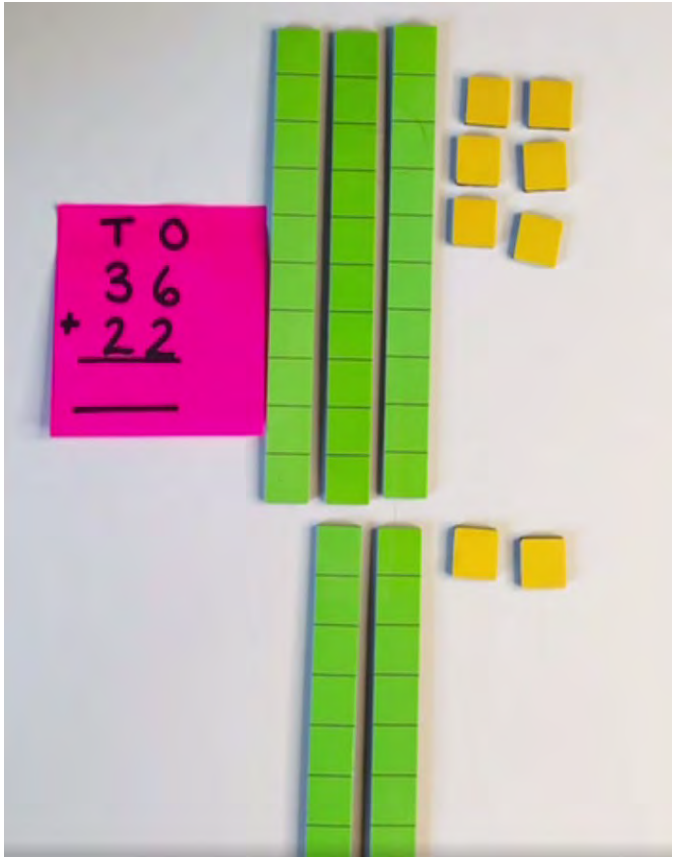
What the children will be moving onto in year 3: column addition

Enfield Heights ACADEMY

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

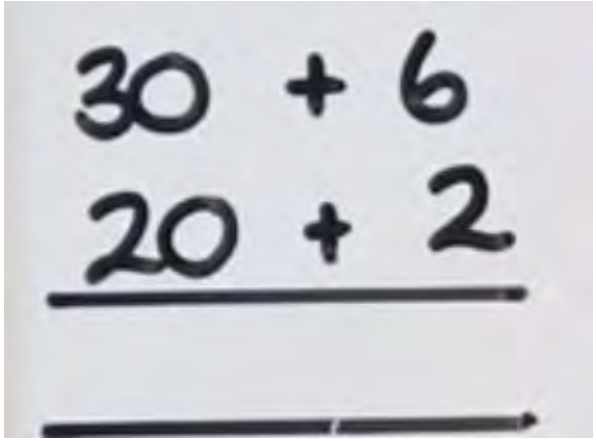
Can the children read the number 36? And represent it?

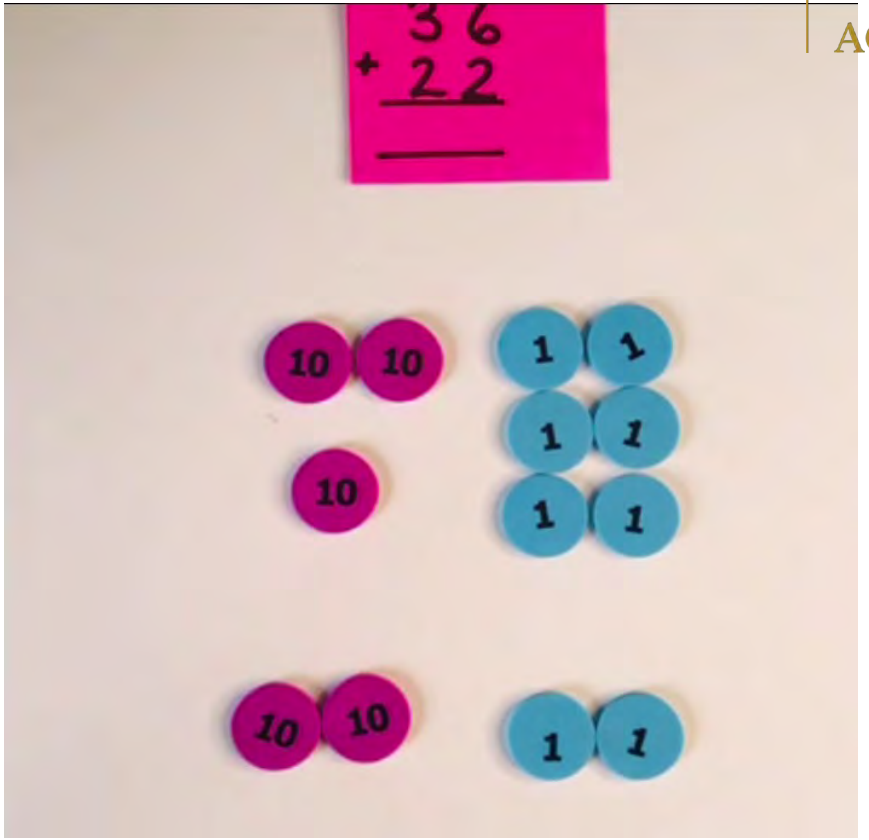
Can the children partition the number into tens and ones?



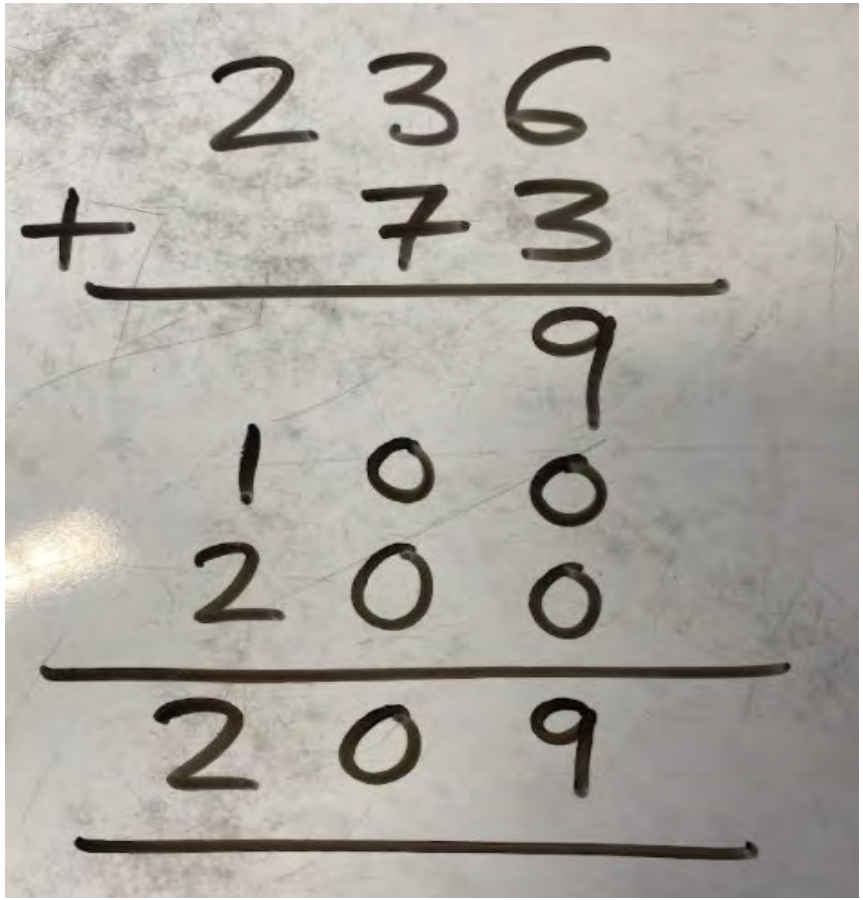
Enfield Heights ACADEMY

The same calculation represented with place value counters.





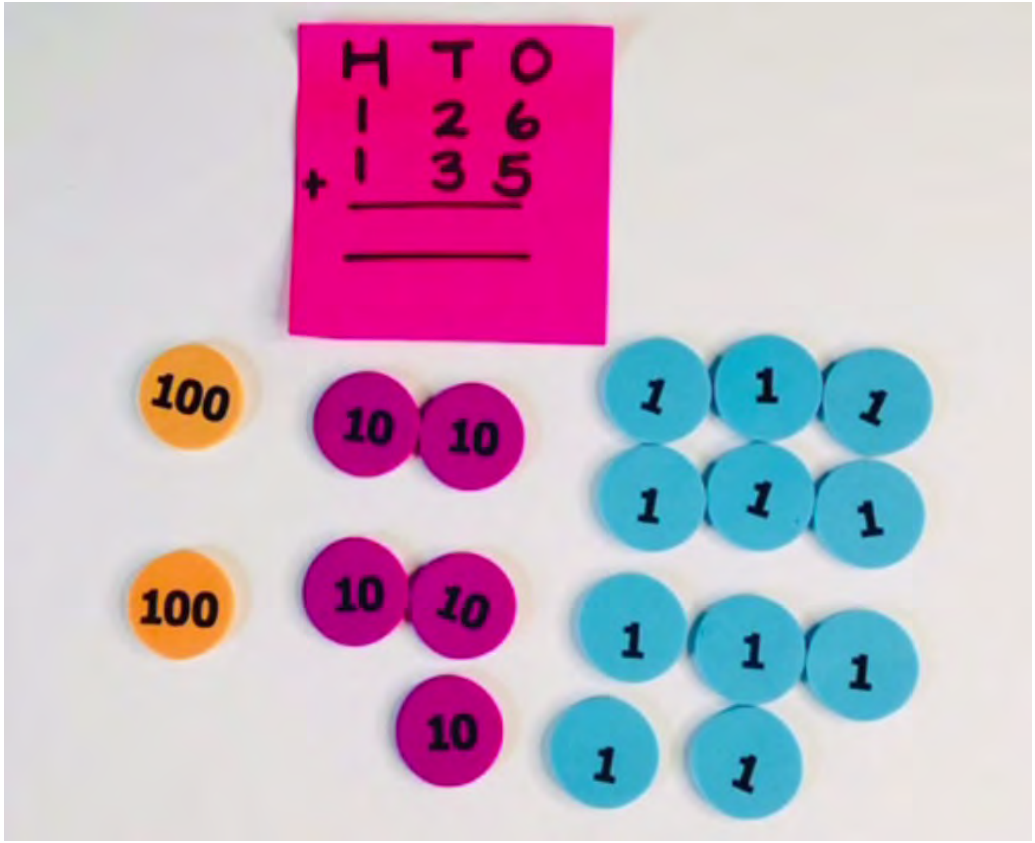
Begin with the partitioned/expanded method



Enfield Heights ACADEMY

Move onto the formal column method and progress to regrouping

Enfield Heights ACADEMY



Representing what actually happens in the maths.

Are the children secure in their place value knowledge? How many ones, tens and hundreds are there?

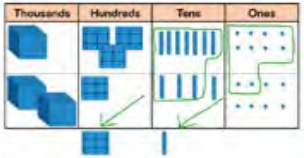
Calculation policy

Enfield Heights ACADEMY

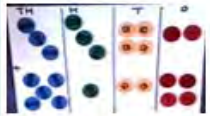
Year 4 - Addition

Concrete

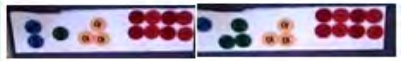
- Use of Base 10 up to 4 digits



- Use of place value counters for columnar addition



- Use of place value counters for Bar Models (continuous)



Oracy Sentence Stems:

The calculation tells me I need to add the numbers.

If the column total is equal to ten or more we must exchange.

I will exchange one hundred for ten tens.

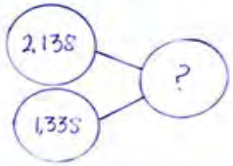
____ add ____ is equal to ____

____ thousand add ____ thousand is equal to ____ equal

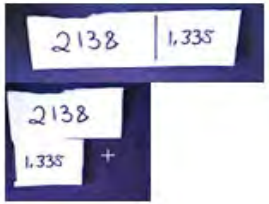
Pictorial

- Pictorial Representation of Base 10 and place value counters

- Part Part Whole Models



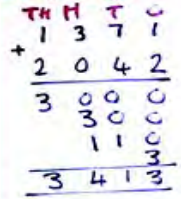
- Bar Modelling (Part Part Whole and Comparison)



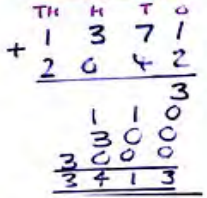
Abstract

- Continue with expanded columnar addition

Most significant digit

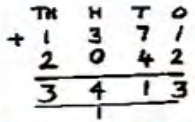


Least significant digit

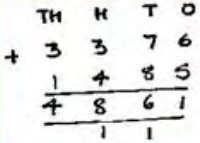


- Continue with Formal Columnar Addition

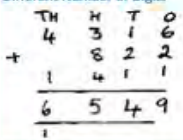
Exchange tens to hundreds



Exchange ones to tens and tens to hundreds



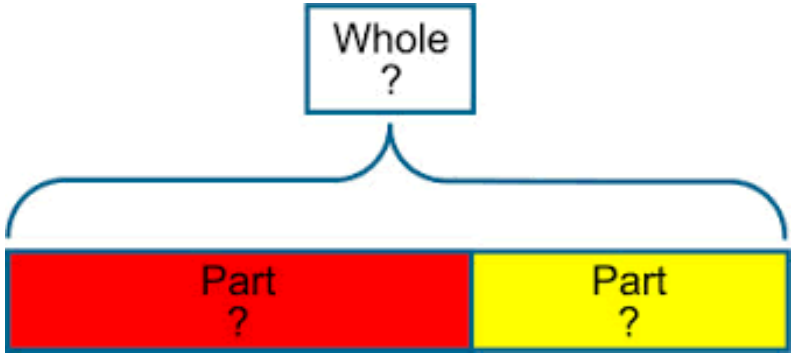
Different Number of Digits



Addition with four digit numbers – 1s, 10s, 100s and 1000

Addition using bar models

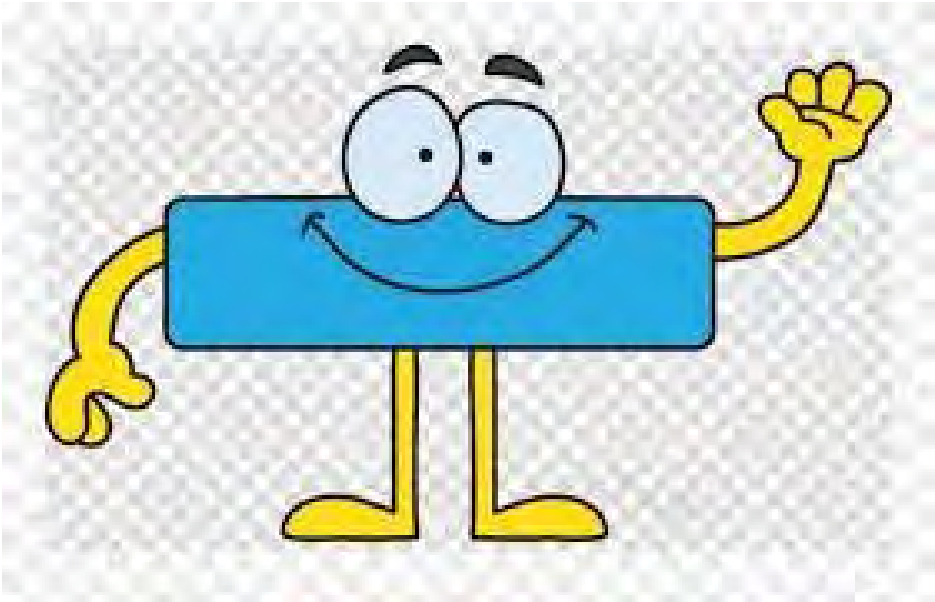
Enfield Heights ACADEMY



If 5,945 is a part and 1,052 is a part, _____ is the whole

Subtraction in Year 3 & 4

Enfield Heights ACADEMY



Calculation policy

Enfield Heights ACADEMY

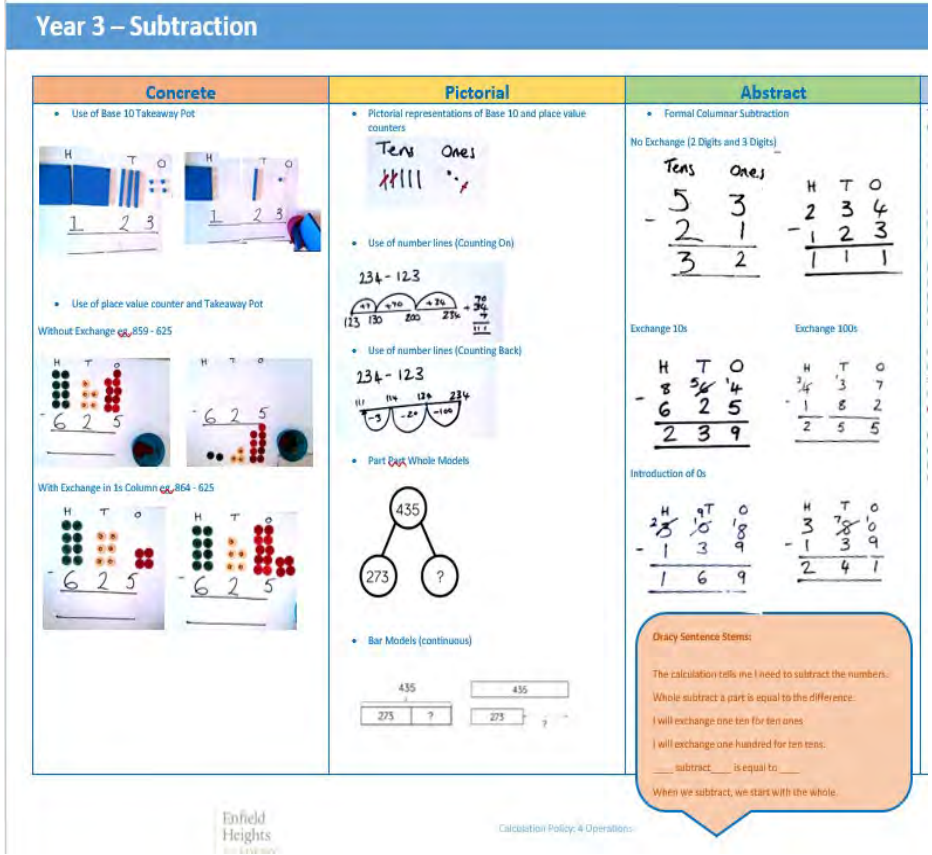
Expanded method using partitioning.

Move onto exchange in year 3.

We do not use the word borrow, as it's not accurate and not a method we use anymore, as it doesn't support understanding.

We say **exchange!**

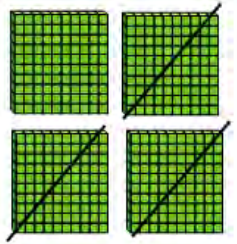
Move onto formal column method.



No exchange

Enfield Heights ACADEMY

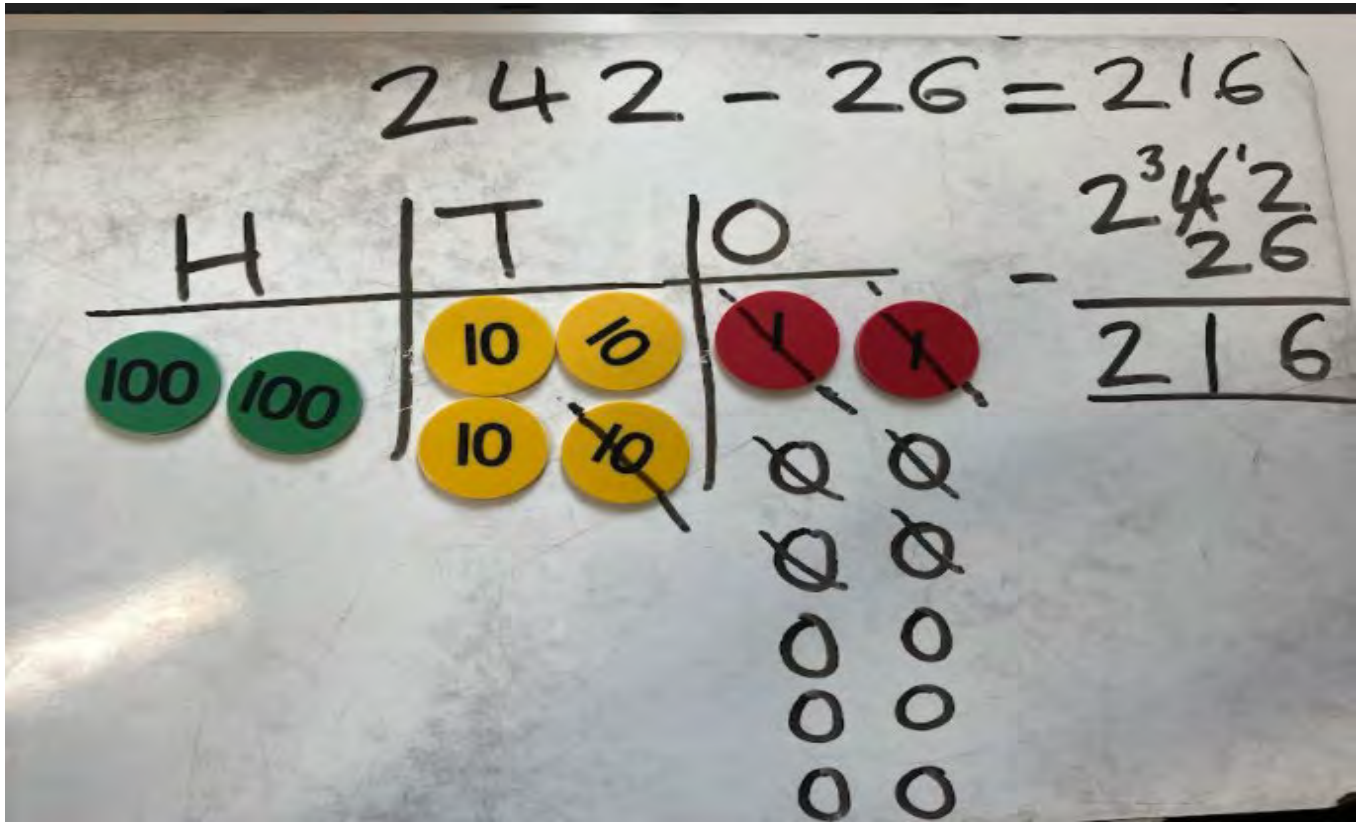
$$438 - 325 = 113$$

Hundreds	Tens	Ones
		
1	1	3

	H	T	O	
	4	3	8	
−	3	2	5	
	1	1	3	

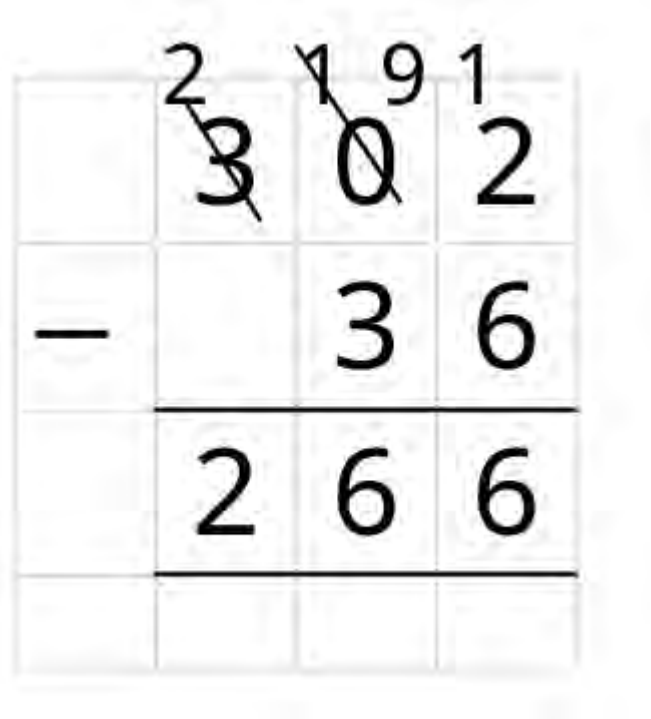
Exchange

Enfield Heights ACADEMY



Move onto formal column method

Enfield Heights ACADEMY



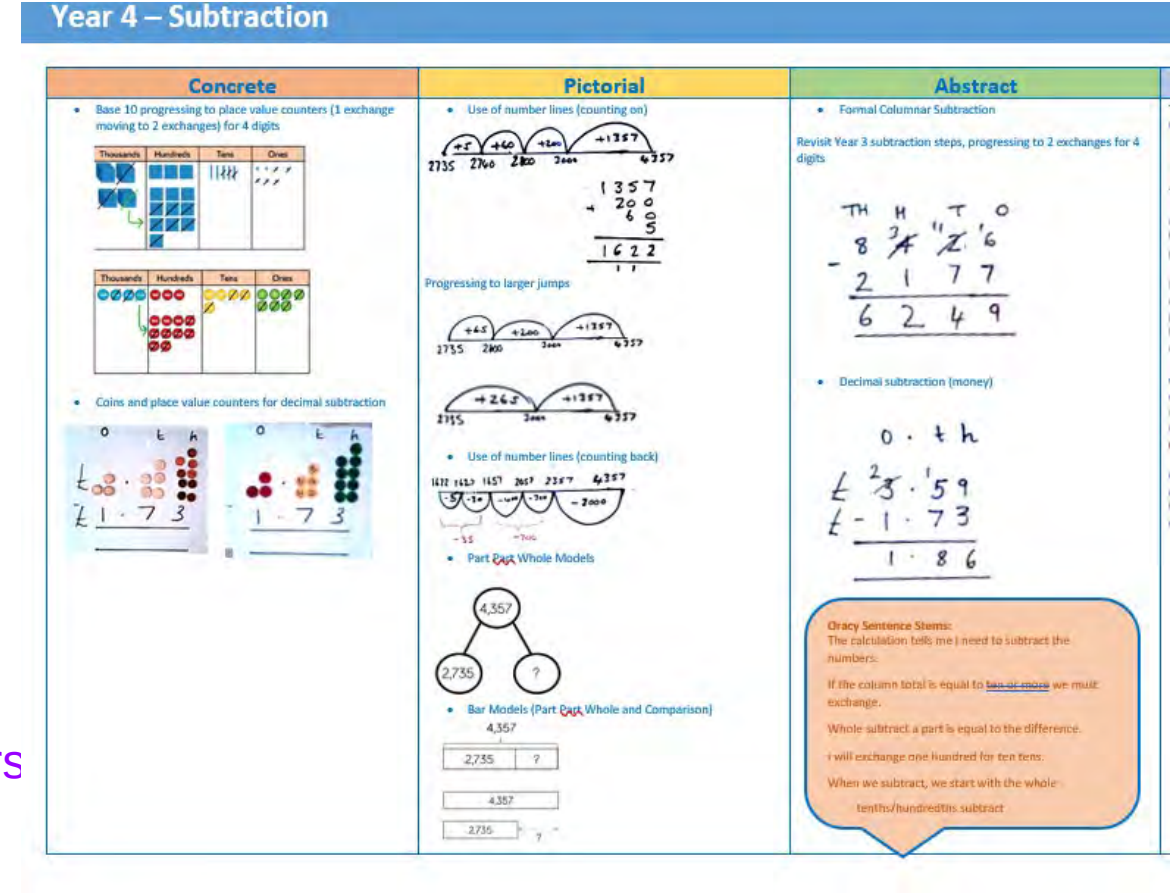
Enfield Heights ACADEMY

Calculation policy

Moving onto subtraction with 4 digit numbers.

Compact/formal written Method.

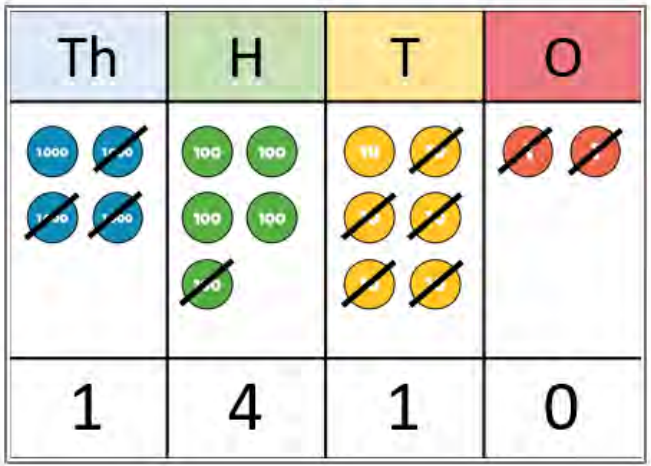
Estimate and use the inverse to check answers

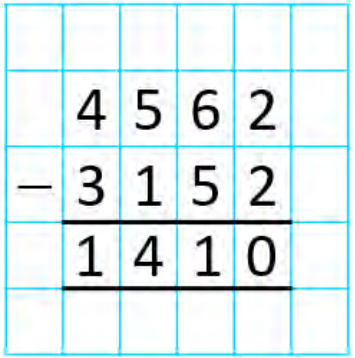


No exchange

Enfield Heights ACADEMY

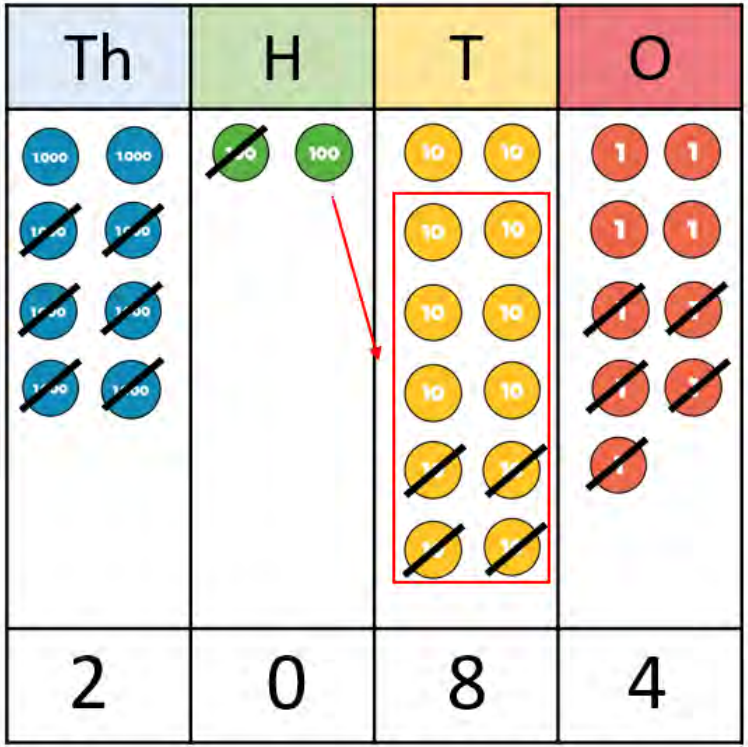
$$4{,}562 - 3{,}152 = 1{,}410$$





With exchange

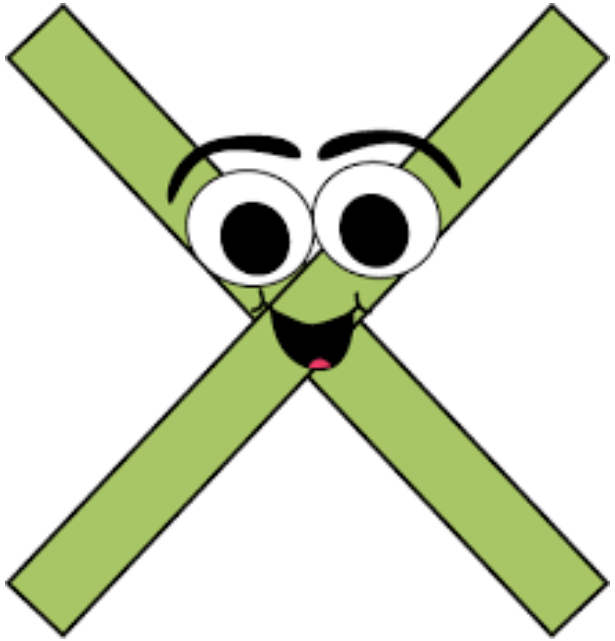
Enfield Heights ACADEMY



	8	$\cancel{2}^{1}$	$^{1}2$	9	
−	6	1	4	5	
	2	0	8	4	

Multiplication in Year 3 & 4

Enfield Heights ACADEMY



Calculation Policy

Year 3 – Multiplication

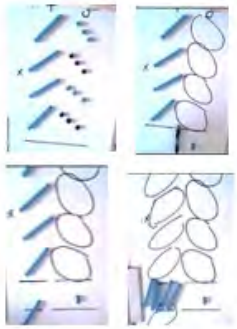
Concrete

- Cuisenaire tracks to show multiples of numbers

- Area Method: Cuisenaire on Squared Paper
  eg. 13 x 4

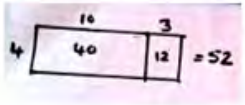
- Grouping Base 10 and Place Value Counters

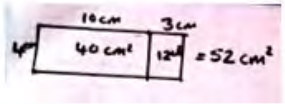
- Grouping Base 10 with exchange of 1s



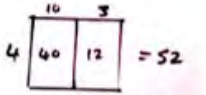
Pictorial

- Area Method: Drawn on squared paper (draw round Cuisenaire)
  eg. 13 x 4

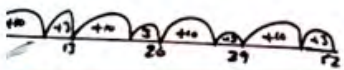




- Grid Method (Area not to scale)



- Jumps on number lines



Oracy Sentence Stems:

To find ten times as many, multiply by ten.

____ is a multiple of ____ because ____

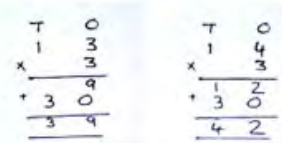
____ multiplied by ____ is equal to ____

Products in the ____ ~~time table~~ are also in the ____ time table.

When we multiply, the parts are known but the whole is unknown.

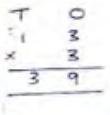
Abstract

- Expanded Columnar Multiplication

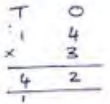


- Formal Columnar Multiplication (Use a multiplier from times tables children are secure with)

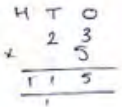
2 ~~digit~~ by 1 digit (no exchange)



2 ~~digit~~ by 1 digit (exchange)



2 ~~digit~~ by 1 digit (3 digit answer)



Enfield Heights ACADEMY

Year 3 children should know their 2, 5, 10 and 3, 4, and 8 times tables.

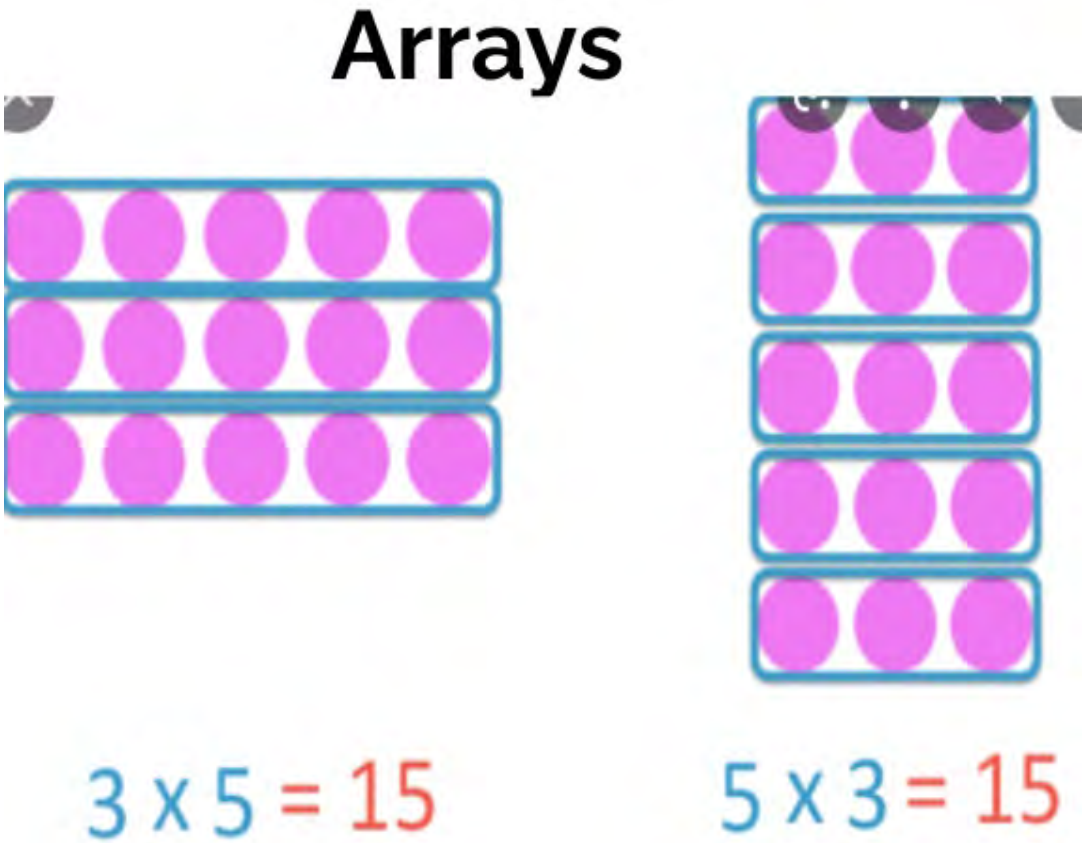
Use grouping to represent understanding .

Introduced to the area and grid method.

Move onto expanded and formal column method.

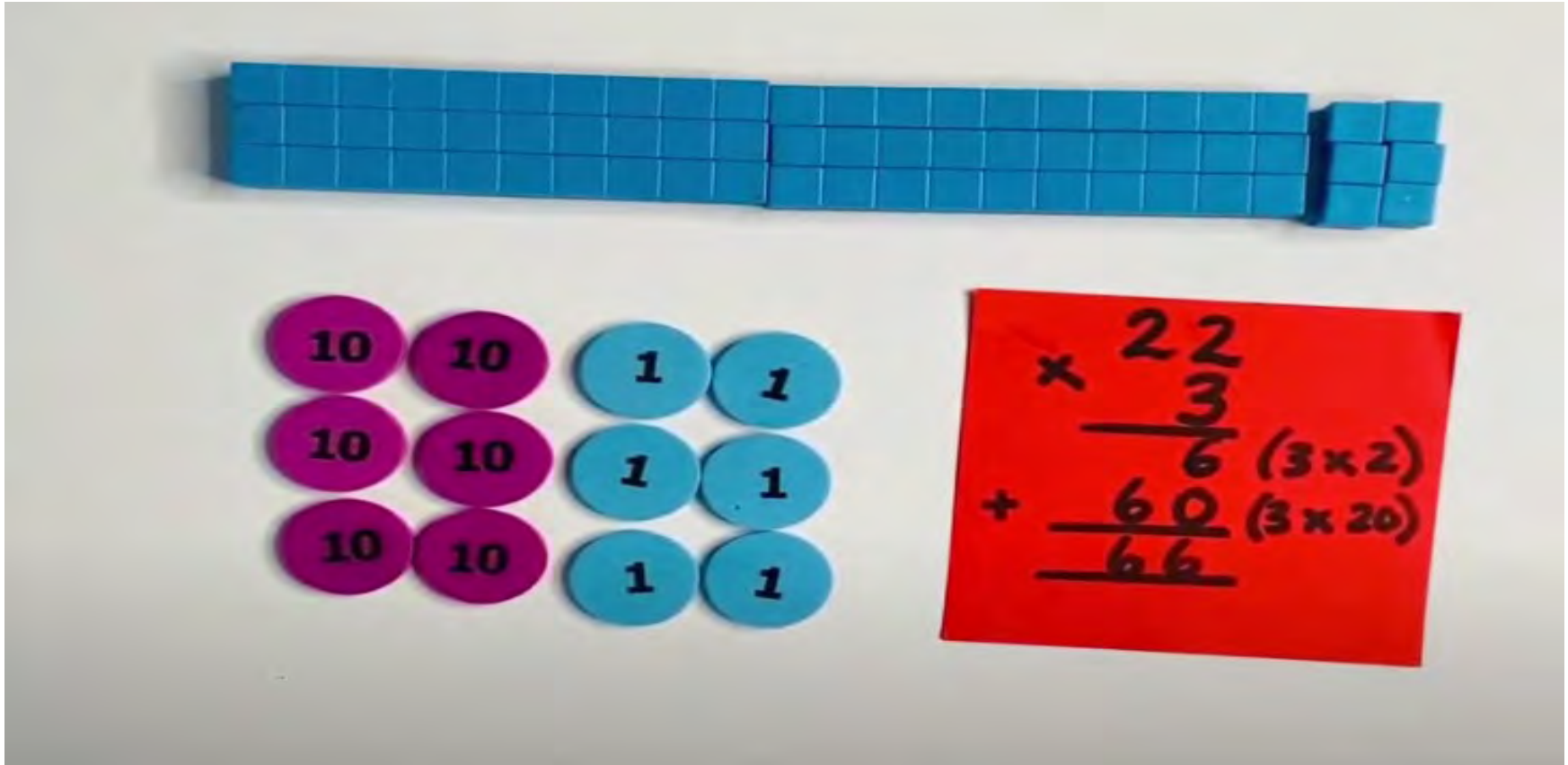
Enfield Heights ACADEMY

Visual representation of the commutative law



Expanded method year 3

Enfield Heights ACADEMY



Grid method year 3

Enfield Heights ACADEMY

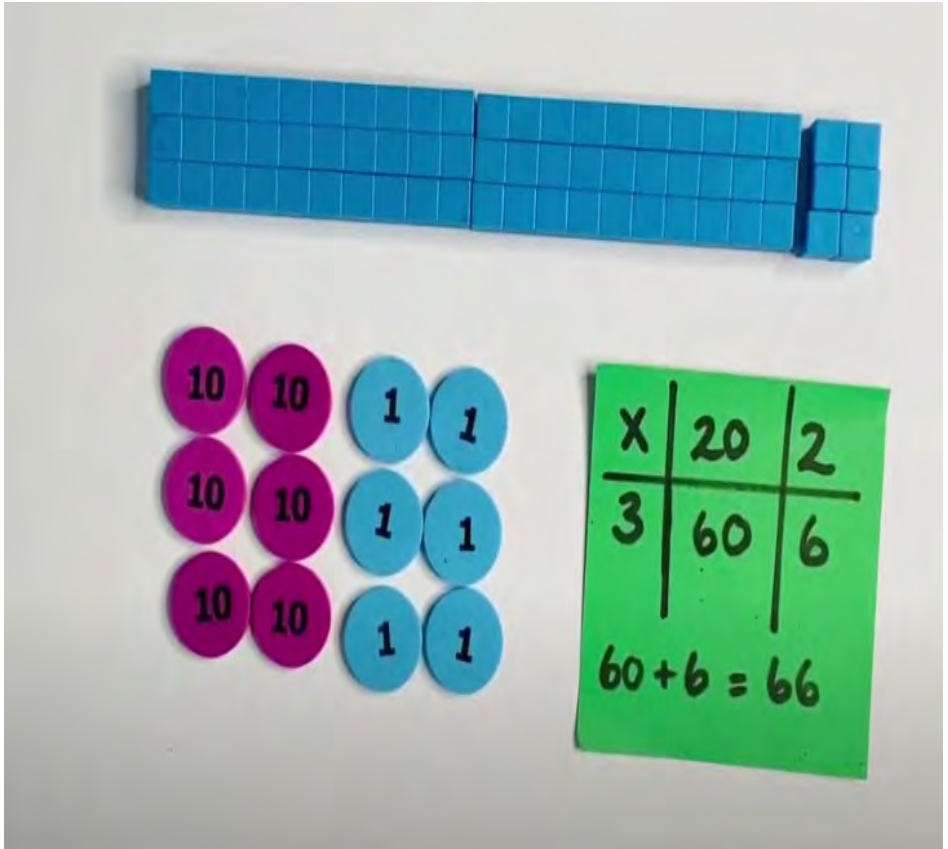
First partition the two digit number e.g. 22 is partitioned into 2 tens and 2 ones

Then multiply each by the multiplier in this case is 3

Finally add the totals.

Always start in my ones column (like I will when I get to the formal method).

If I know that 3 lots of 2 is 6, then I know that 30 x 2 = 60



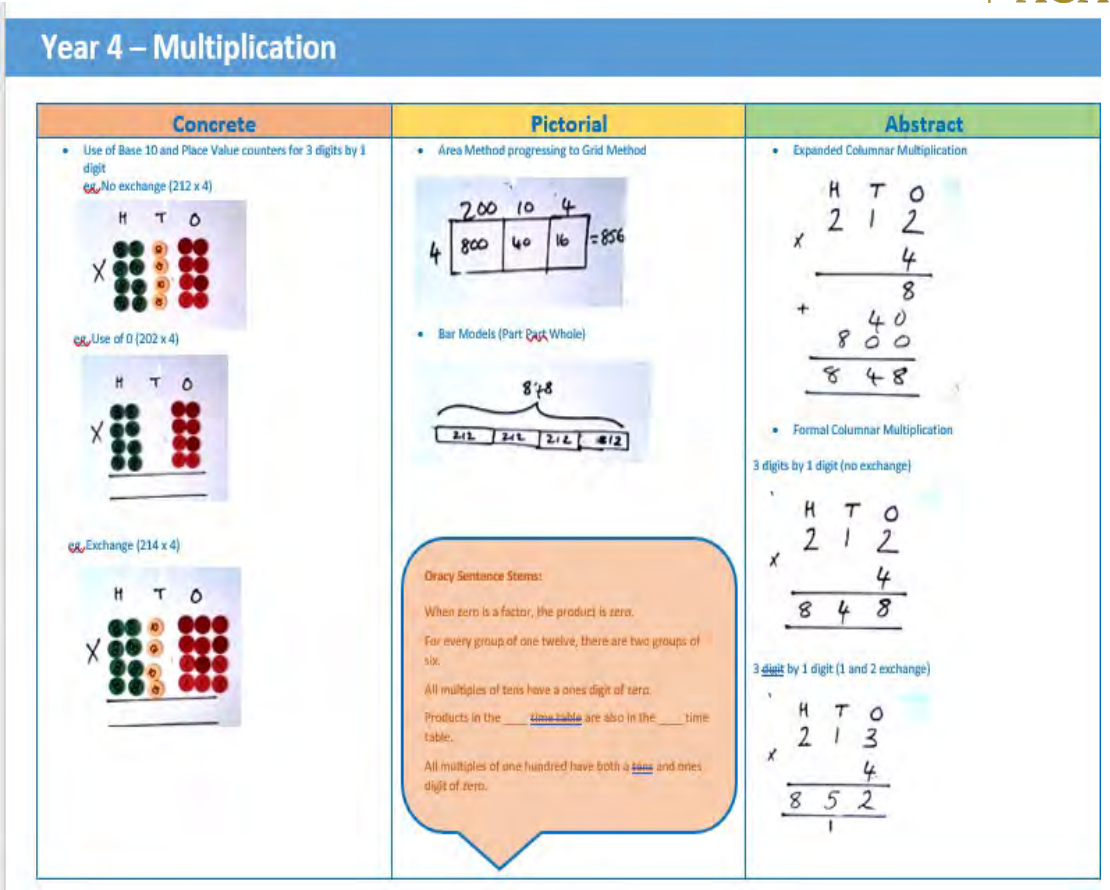
Calculation policy

Enfield Heights ACADEMY

Year 4 children needs to know all of their multiplication tables up to 12 x 12.

Continue with grid and area models

Continue with expanded method and move onto short multiplication.



Year 4 – Multiplication

Concrete

- Use of Base 10 and Place Value counters for 3 digits by 1 digit

eg. No exchange (212 x 4)

eg. Use of 0 (202 x 4)

eg. Exchange (214 x 4)

Pictorial

- Area Method progressing to Grid Method

- Bar Models (Part Part Whole)

Oracy Sentence Stems:

When zero is a factor, the product is zero.

For every group of one twelve, there are two groups of six.

All multiples of tens have a ones digit of zero.

Products in the ____ time table are also in the ____ time table.

All multiples of one hundred have both a tens and ones digit of zero.

Abstract

- Expanded Columnar Multiplication

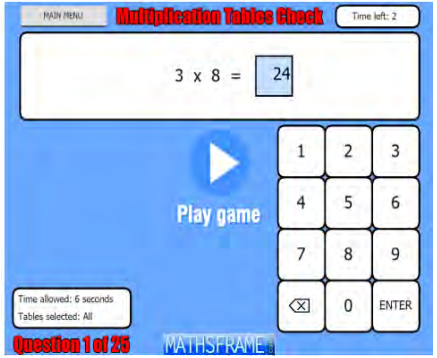
- Formal Columnar Multiplication

3 digits by 1 digit (no exchange)

3 digit by 1 digit (1 and 2 exchange)

The goal – 6 seconds!

Enfield Heights ACADEMY



- Statutory Year 4 Times Tables Check
- Free website:

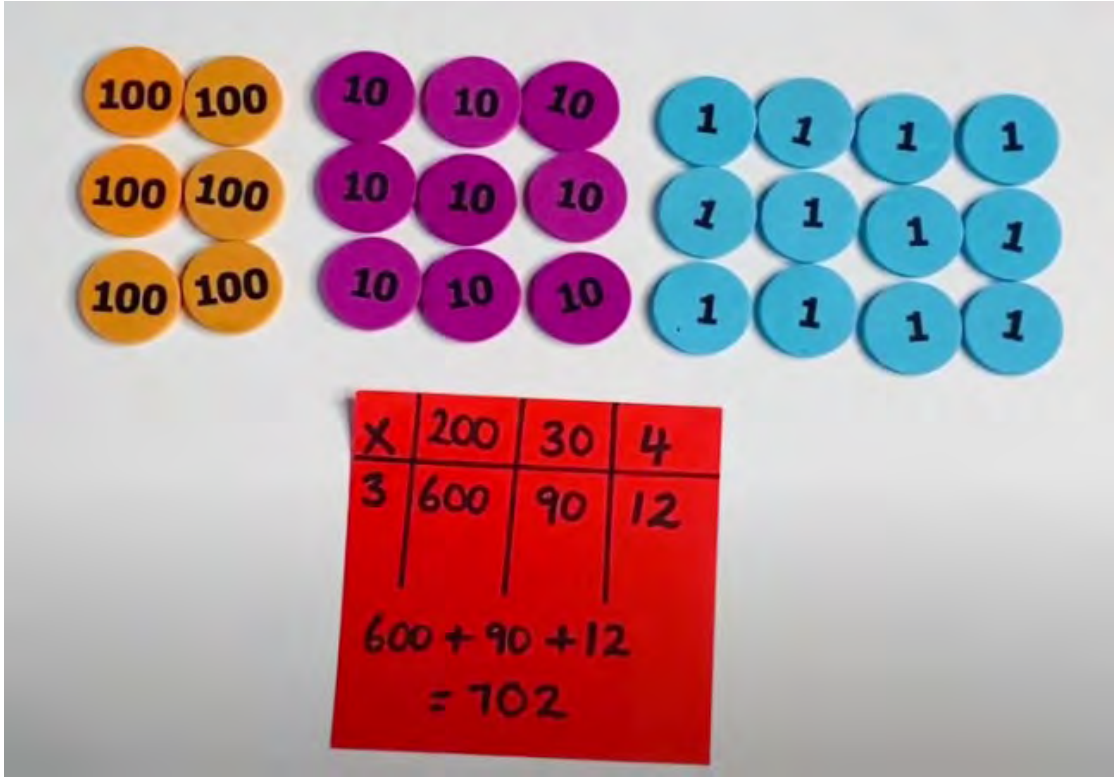
https://mathsframe.co.uk/en/resources/resource/477/ Multiplication-Tables-Check

- Children can see which ones were wrong
- Many creative ways to teach times tables to children: using a counting stick, chanting, repetition, pattern spotting, games, quizzes and more

Enfield Heights ACADEMY

Grid method

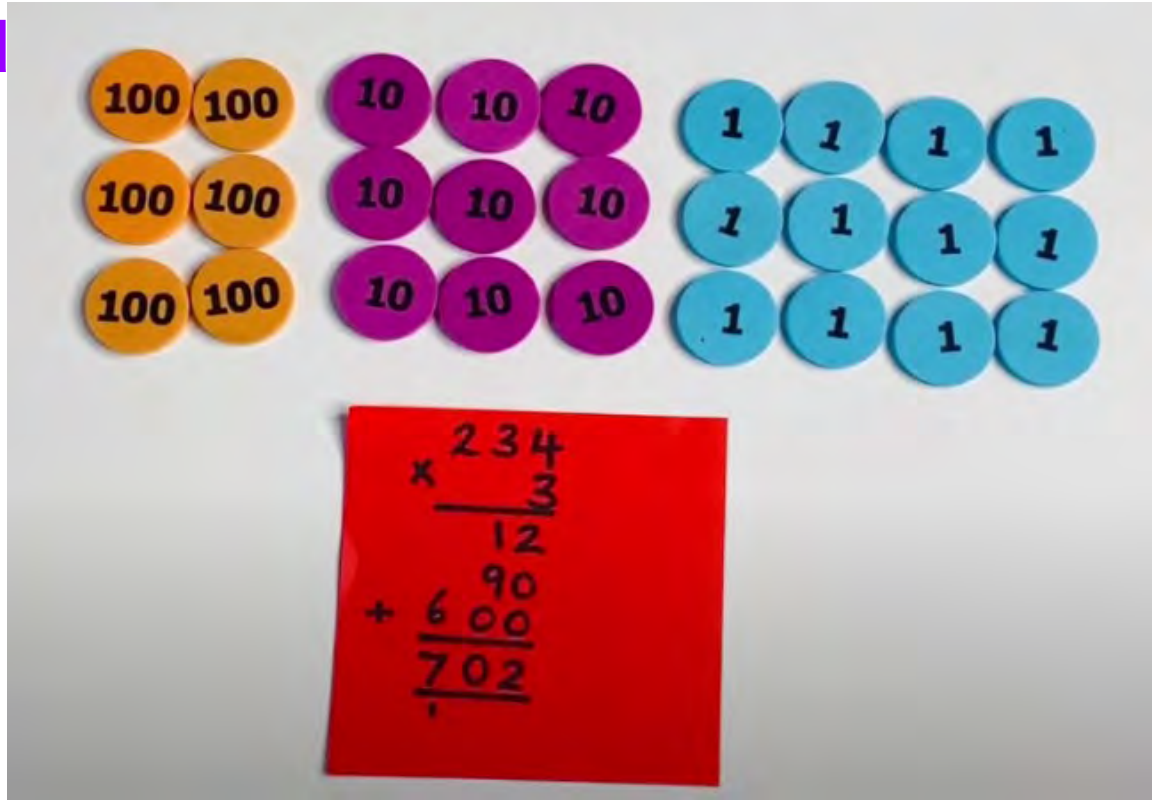
Year 4



Enfield Heights ACADEMY

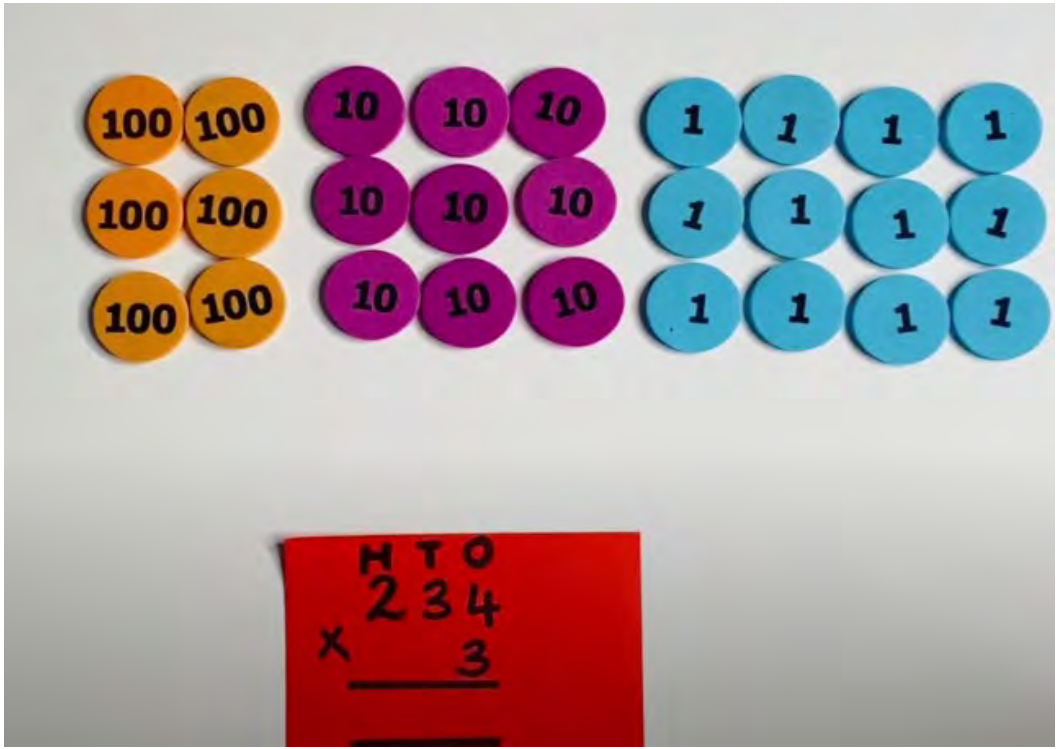
Expanded method

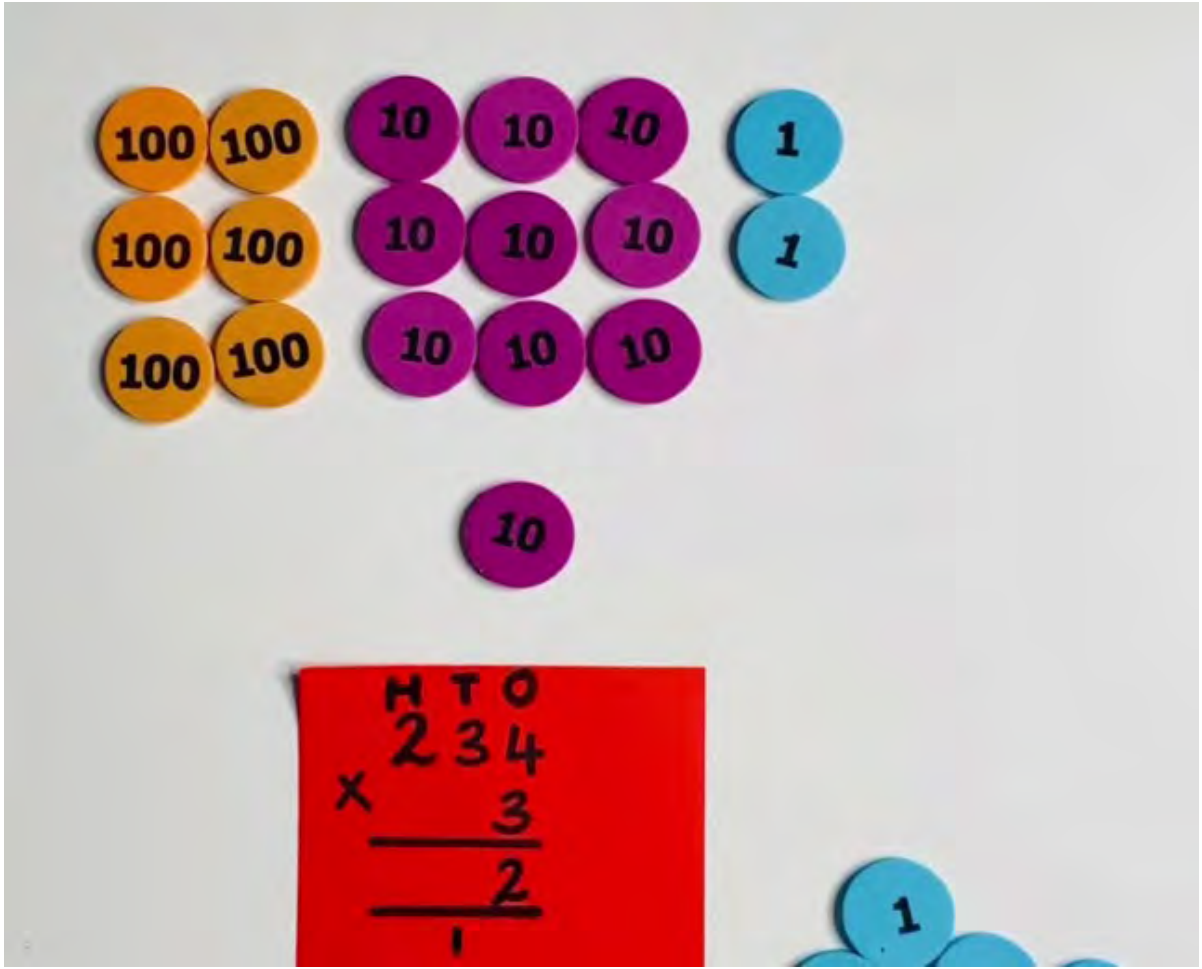
Year 4



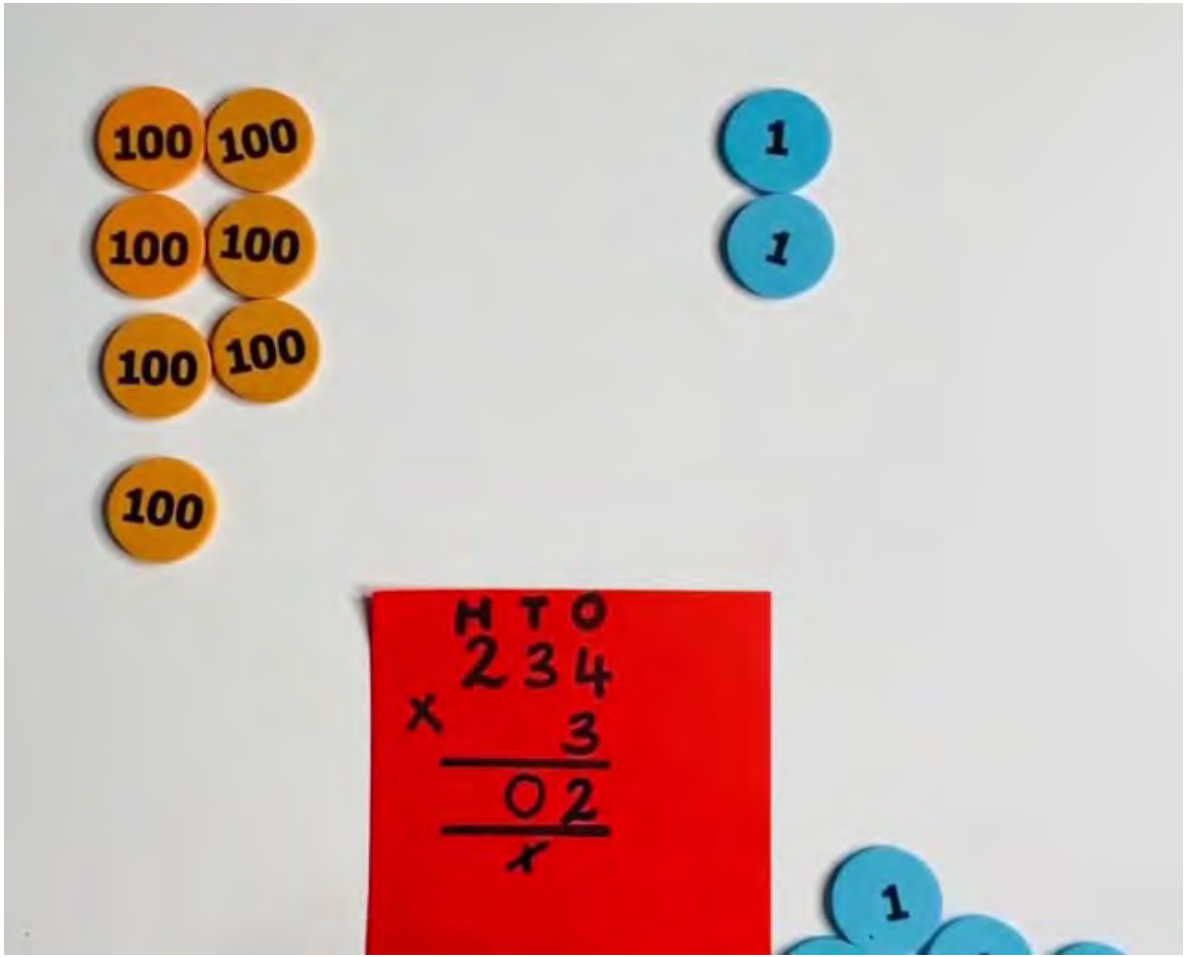
Regrouping - Short multiplication

Enfield Heights ACADEMY

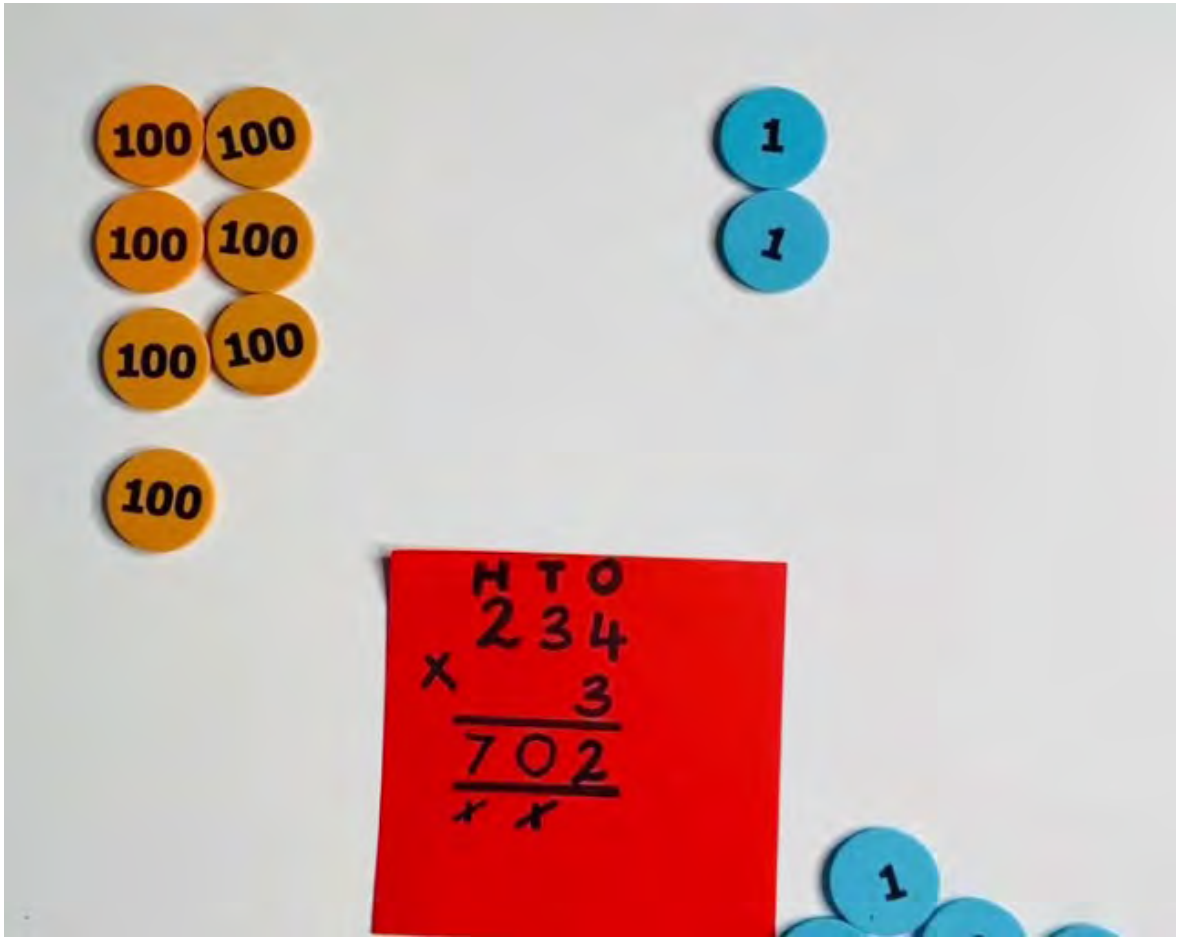




Enfield Heights ACADEMY



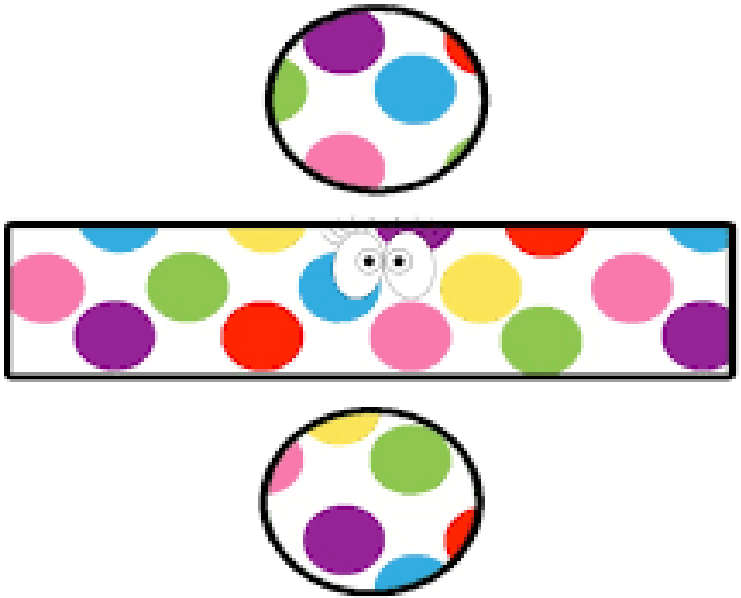
Enfield Heights ACADEMY



Enfield Heights ACADEMY

Division in Year 3 & 4

Enfield Heights ACADEMY



Calculation policy

Enfield Heights ACADEMY

Year 3 – Division

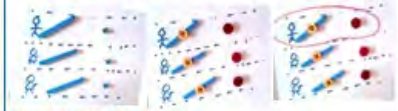
Concrete

- Link division to multiplication through use of arrays and Cuisenaire tracks and the number sentences that can be created from them.

  eg. 15 x 3 = 15 5 x 3 = 15 15 ÷ 3 = 5 15 ÷ 5 = 3

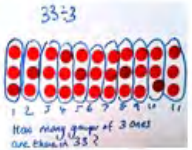
- Sharing using Base 10 and moving to place value counters

No exchange eg. 33 ÷ 3 = 11



Exchange ~~10~~ eg. 42 ÷ 3 = 14

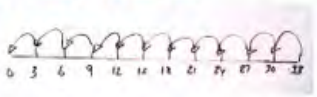
- Moving to grouping



- Concrete bar modelling (continuous)

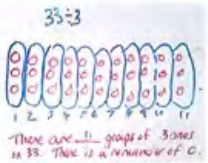
Pictorial

- Counting back on number lines

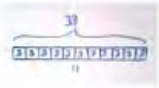


- Representing sharing pictorially

- Representing grouping pictorially



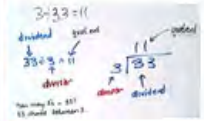
- Drawn bar models



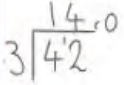
Abstract

- Formal short division

2 ~~digit~~ + 1 digit no exchanging and a remainder of 0



2 digit ÷ 1 ~~digit~~ with exchange and a remainder of 0



Oracy Sentence Stems:

____ divided by ____ is equal to ____.

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

____ x ____ is the same as ____ groups of ____

When we divide ____ by ____ there is a remainder of 0 which means it can divide equally.

Division facts for the 3, 4 and 8 times tables.

Dividing 2 digits by a 1 digit number.

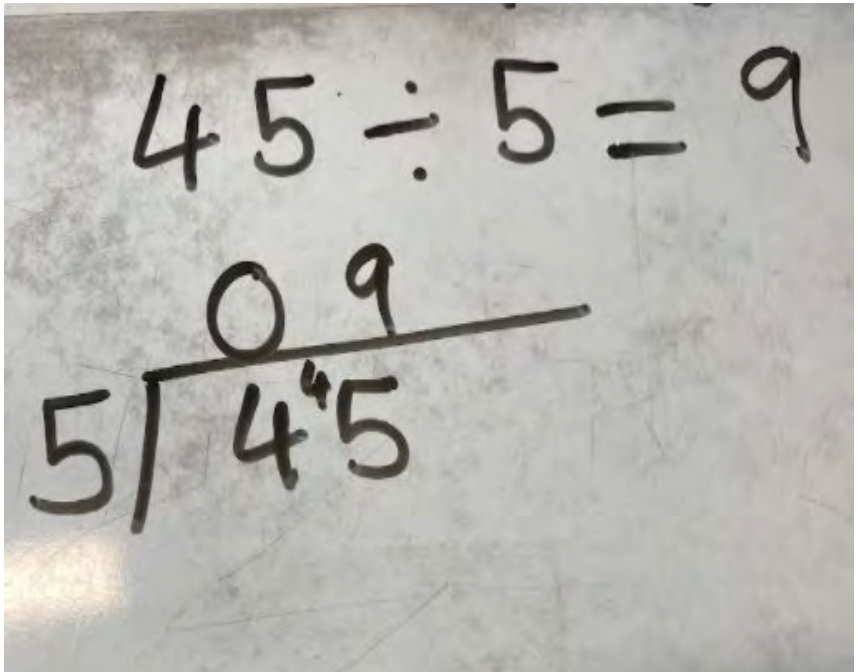
Introduce short division.

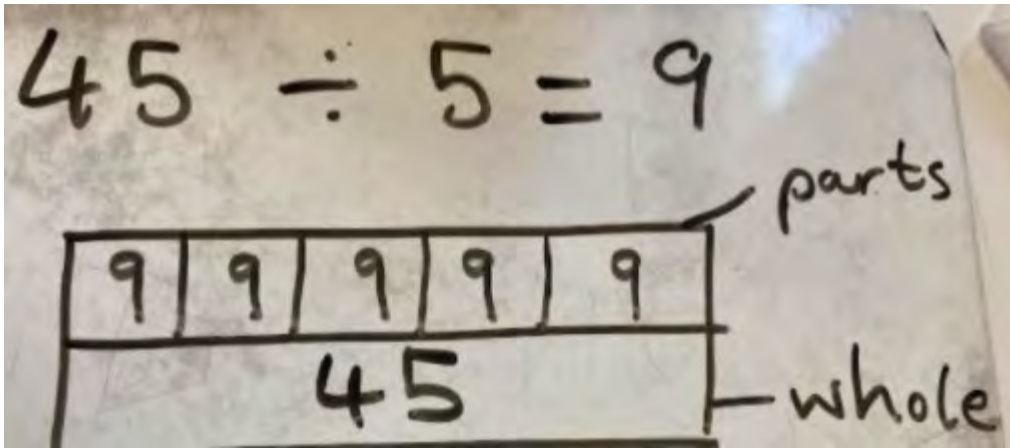
No remainders, only carrying!

Short division

Bar model representation

Enfield Heights ACADEMY





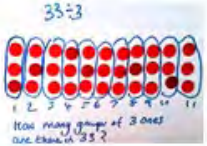
Calculation policy

Enfield Heights ACADEMY

Year 4- Division

Concrete

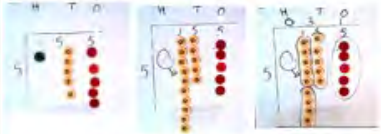
- As per year 3, grouping counters



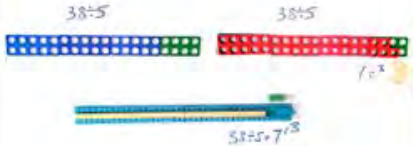
- Moving to grouping place value counters in a formal method layout:

No exchange with a remainder of 0

3 ~~digit~~ with exchange with a remainder of 0

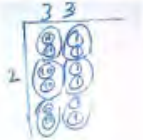


- Introduction of remainder greater than 0 using Numicon ~~and Cuisenaire~~ tracks

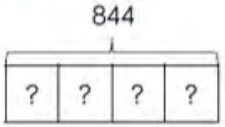


Pictorial

- Pictorial representation of grouping



- Bar modelling (continuous)



Oracy Sentence Stems:

For every group of one twelve, there are two groups of six.

____ is divided into groups of ____. ~~There~~ are ____ groups and a remainder of ____.

The remainder is always less than the divisor.

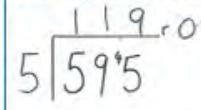
When we divide, the whole is known and the number or parts or the value of the parts is also known.

How many groups of 500 are there in 100? There are 0 groups of 5 hundreds in 1 ~~hundred~~. I will exchange 100 for 10 tens. How many groups of 5 tens are there in 15 tens? There are 3 groups of 5 ~~tens~~ in 15 tens.

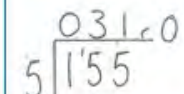
Abstract

- Formal short division

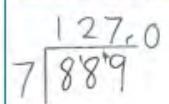
3 digit ÷ 1 ~~digit~~ (exchanging tens to ones and a remainder of 0)



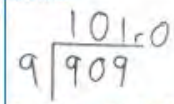
3 ~~digit ÷~~ 1 digit (exchanging hundreds to tens and a remainder of 0)



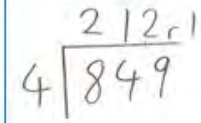
3 ~~digit ÷~~ 1 digit (exchanging twice and a remainder of 0)



Use of 0s



Remainders greater than 0



Division facts for all tables up t0 12 x 12.

Progress to short division with remainders.

Manipulatives - concrete resources

Enfield Heights ACADEMY

Dienes

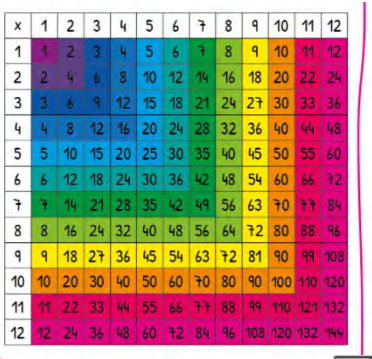
Multiplication grids

Place value counters

100 squares

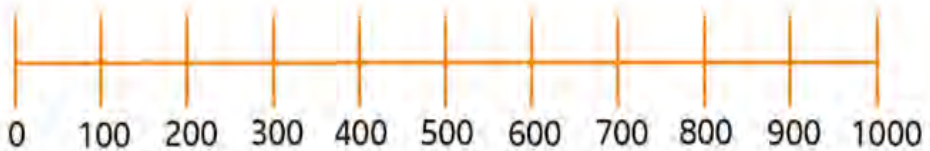
Number lines

Coins



x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

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

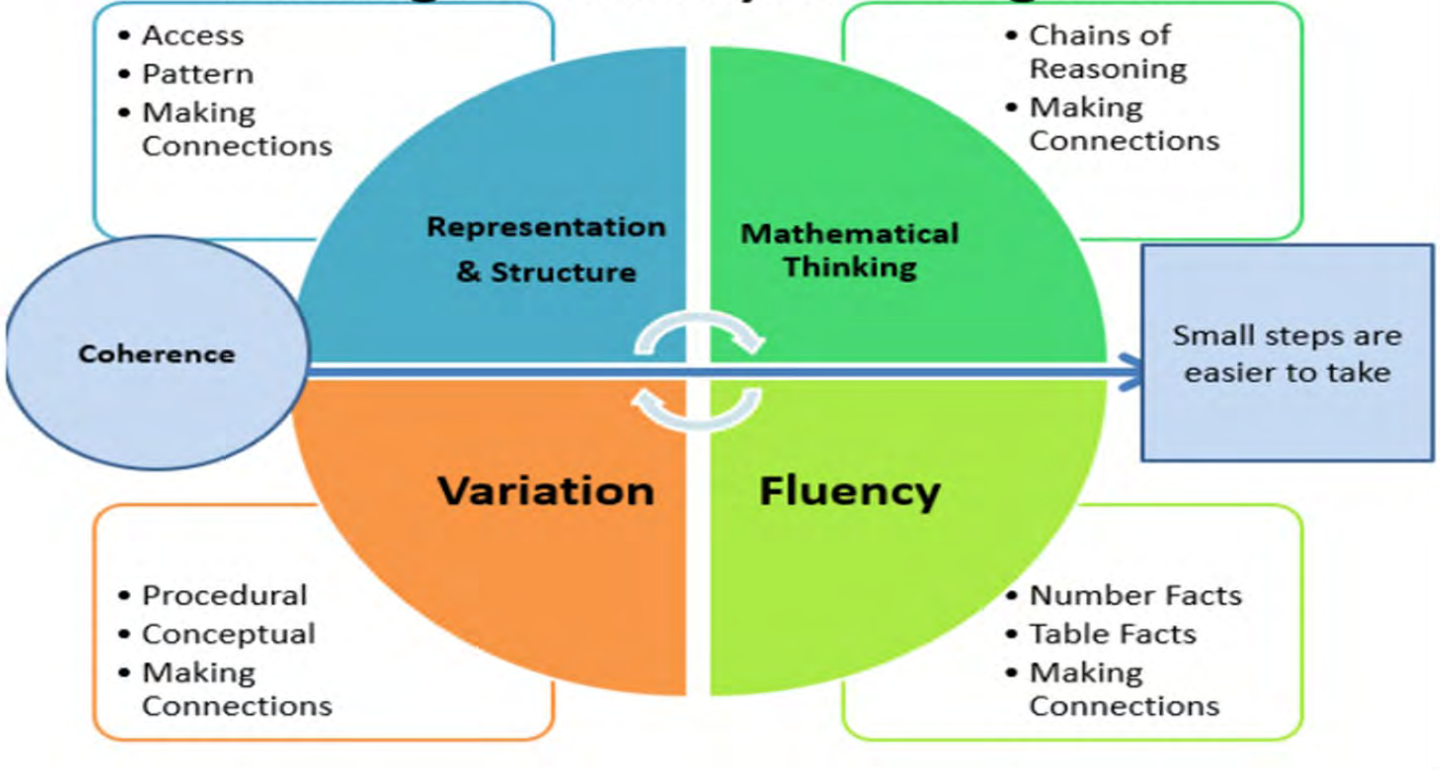
Enfield Heights ACADEMY

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

Enfield Heights ACADEMY

Teaching for Mastery: The 5 Big Ideas



Making generalisations

Enfield Heights ACADEMY

- 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)

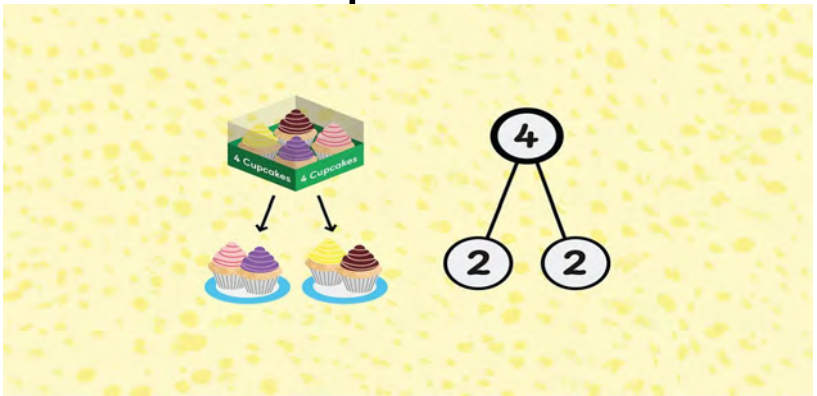
- All even numbers end in 0, 2, 4, 6, 8

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

Representation and Structure

Enfield Heights ACADEMY

- 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).

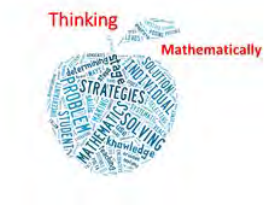
Enfield Heights ACADEMY

Multiple representations of the same number.

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

Enfield Heights ACADEMY

Mathematical Thinking



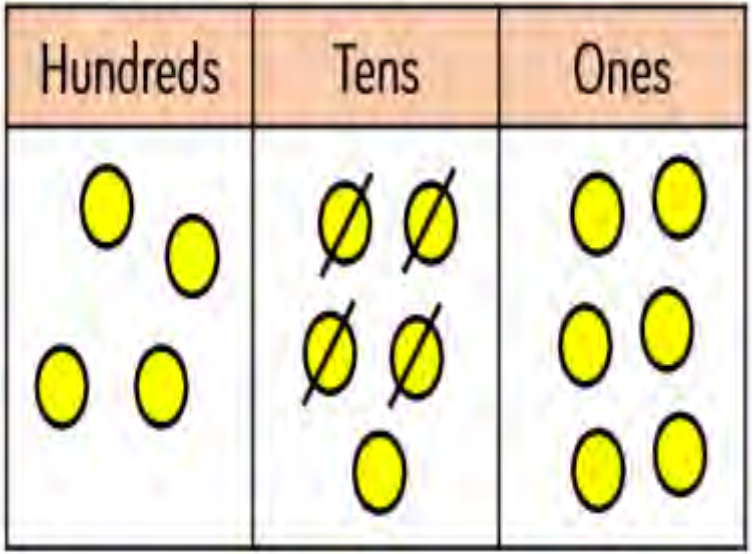
- If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the pupil: thought about, reasoned with and discussed with others.
- We provide lots of opportunities for peer and collaborative discussions in our daily maths lessons.
- Problem solving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

Reasoning: Spotting mistakes and misconceptions

Enfield Heights ACADEMY

Alex thinks the chart shows 456 – 4

Do you agree?



Rosie completes this subtraction incorrectly.

$$\begin{array}{r} 28701 \\ -\ 7621 \\ \hline 21180 \\ \hline \end{array}$$

Explain the mistake to Rosie and correct it for her.

Reasoning: True or false?

Enfield Heights ACADEMY

True or False?

$49{,}999 - 19{,}999 = 50{,}000 - 20{,}000$

I did not need to use a written method to work this out.

Dora

Can you explain why Dora's method work?

Can you think of another example where this method could be used?

Reasoning: Always, sometimes or never true?

Enfield Heights ACADEMY

Always, sometimes, never

- When multiplying a two-digit number by a one-digit number, the product has 3 digits.
- When multiplying a two-digit number by 8 the product is odd.
- When multiplying a two-digit number by 7 you need to exchange.

Prove it.

Fluency

Enfield Heights ACADEMY

- Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics.
- Playing cards in class for times table practice
- Hit the button - Topmarks for quick fire number fact practice
- TT Rockstars- all KS2 classes set up- an exciting online resource for times table practice.
- Weekly times tables quizzes
- Number fact fluency work

Using known number facts: if we know this, what else do we know?

Enfield Heights ACADEMY

60 x 30 = 1800

600 x 300 = 180, 000

60 x 3 = 180

6 x 3 + 1 = 19

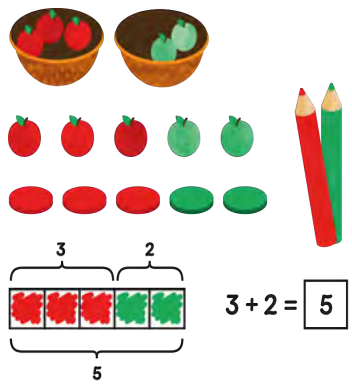
18 = 3 x 6

18 ÷ 3 = 6

6 = 18 ÷ 3

0.5 x 12 = 6

Conceptual variation

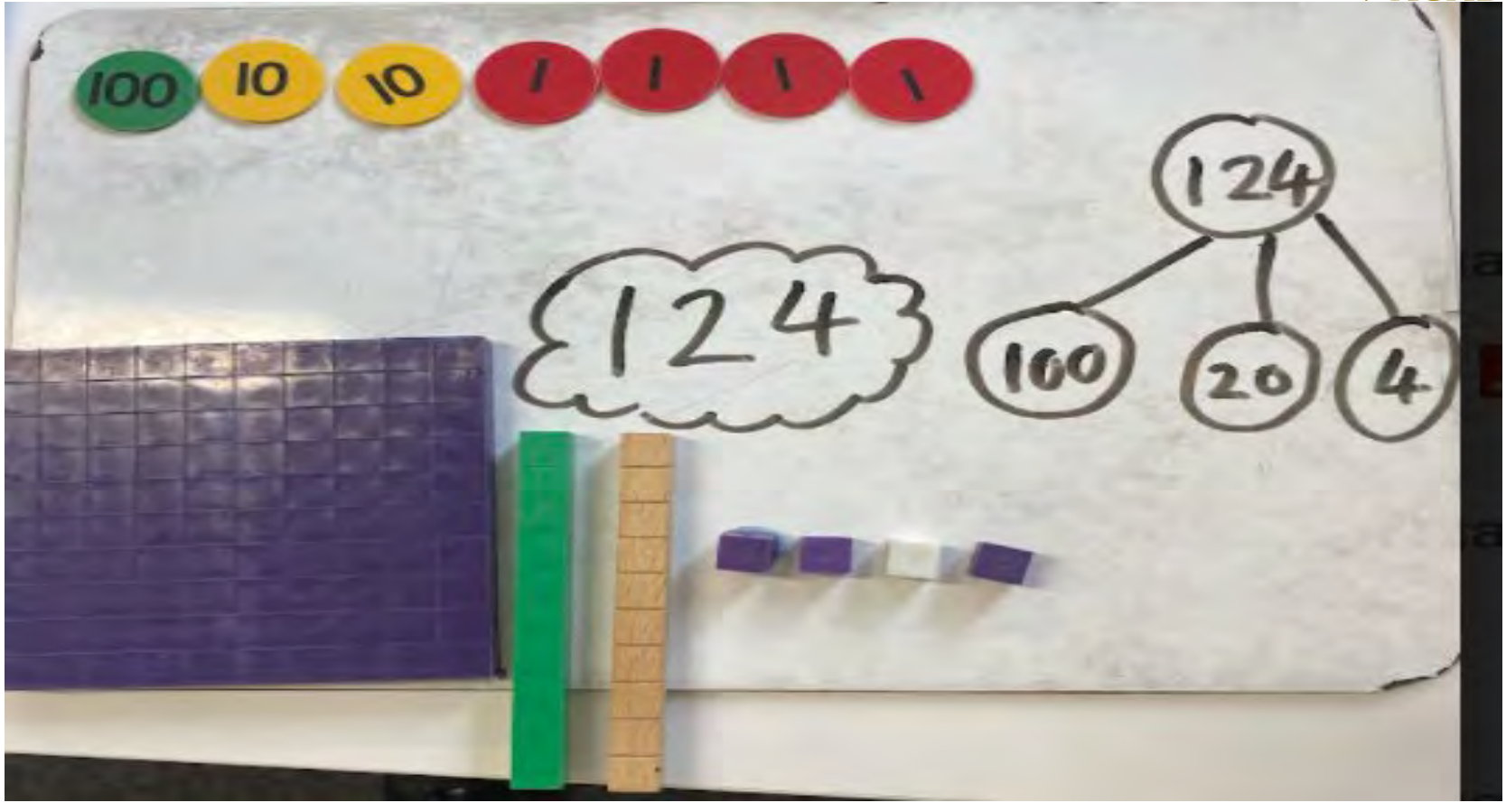


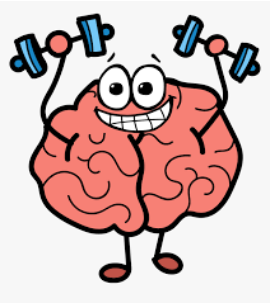
Enfield Heights ACADEMY

- This is about all about how the teacher represents the concept being taught
- An opportunity to work on different representations of the same mathematical idea.
- These multiple representations will 'showcase' to pupils the different conceptual ideas that underpin a mathematical idea.

Variation helps visualisation

Enfield Heights ACADEMY





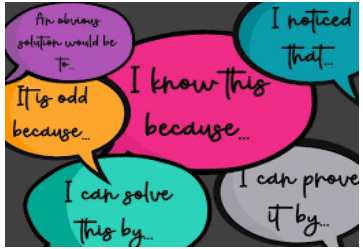
Everyone Can!

I can learn from my mistakes.

Enfield Heights ACADEMY

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

Enfield Heights ACADEMY

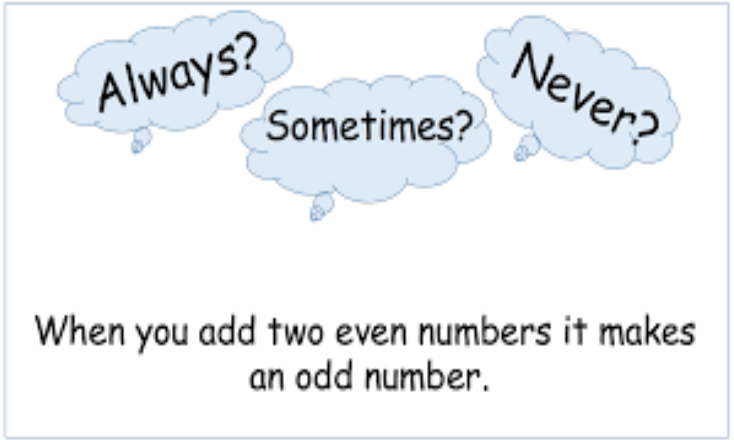
- **Key Vocabulary:** Discussing essential vocabulary
- **Full sentences** : Teachers and children need to use full sentences to explain or respond. When children use complete sentences, it both reveals their understanding and embeds their knowledge.
- **Stem sentences:** These help children express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

Enfield Heights ACADEMY

- 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?

Enfield Heights ACADEMY