Year 5 & 6 Maths Parent Workshop

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Deputy Headteacher and Maths Subject Lead

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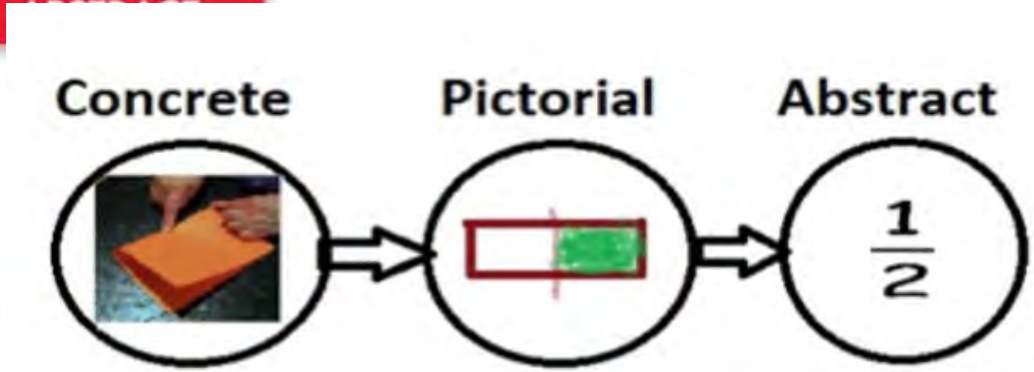
Maths should be practical for all ages and the CPA approach used at any time and with any age to support understanding



Addition in Year 5 & 6

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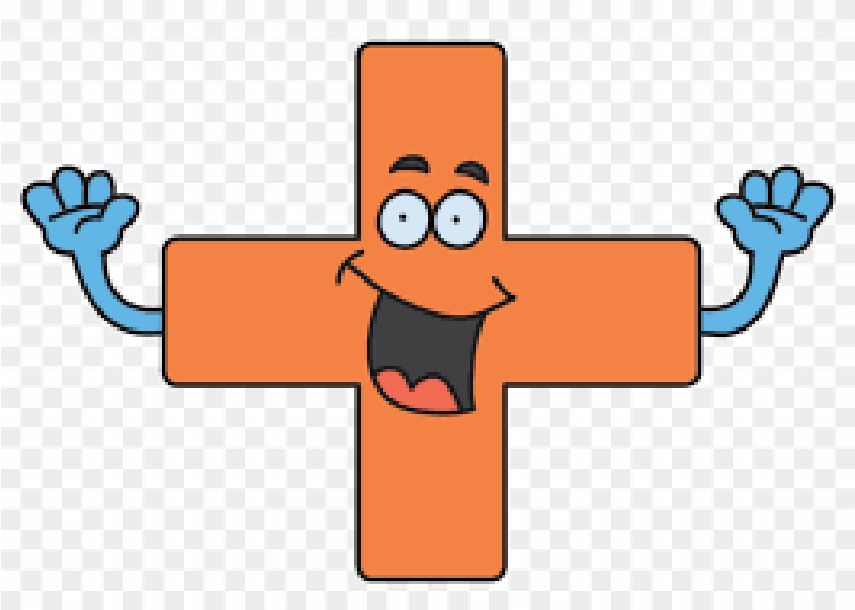

Calculation policy

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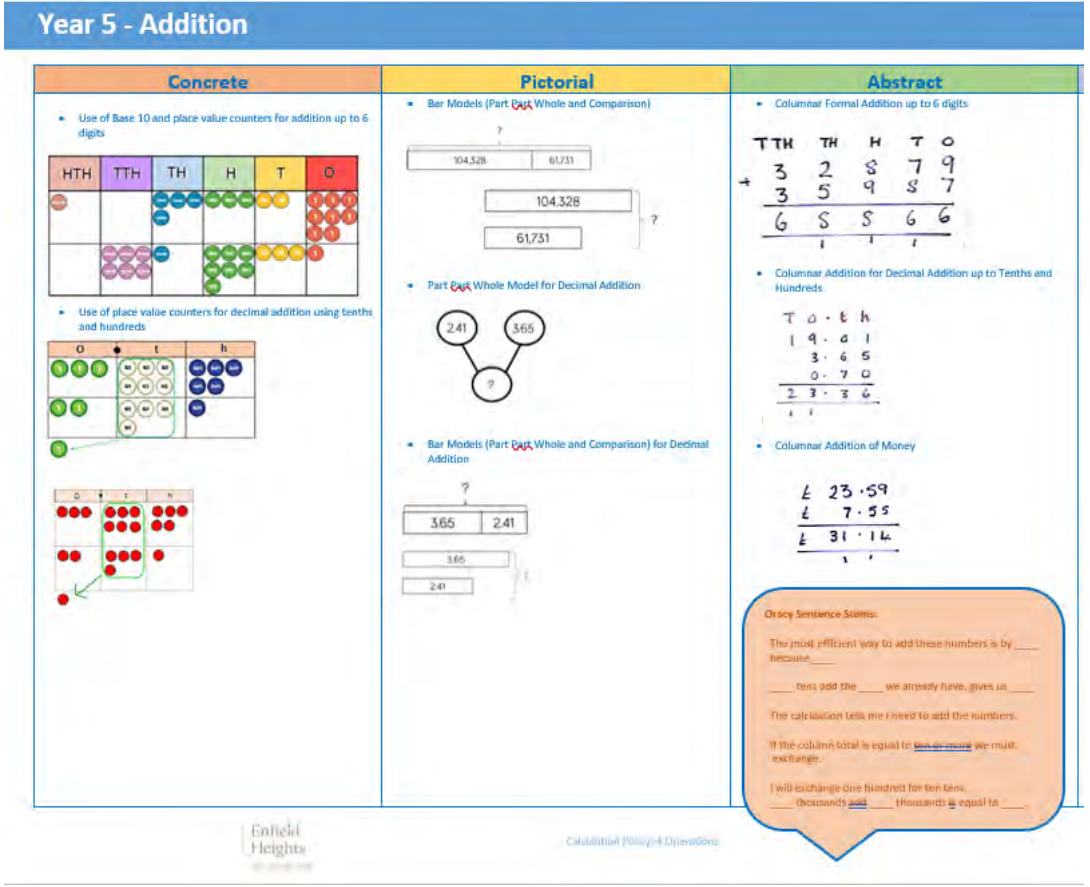
Addition with up to 6 six digit numbers.

Column formal addition for adding decimals with tenths and hundredths.

Column addition of money.



Addition using place value counters

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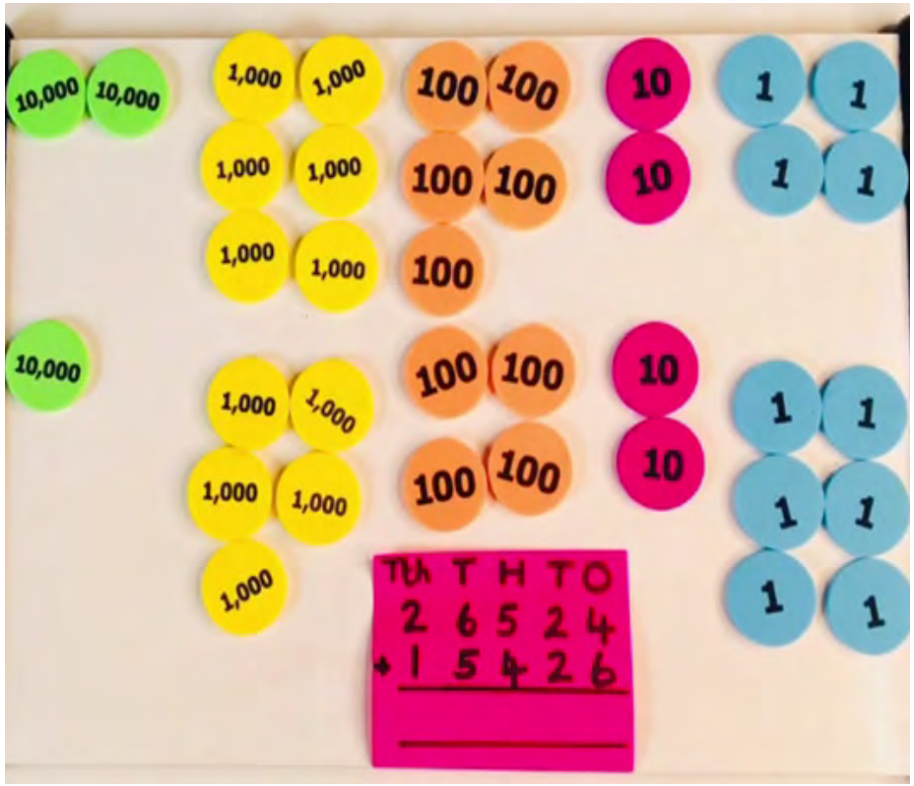

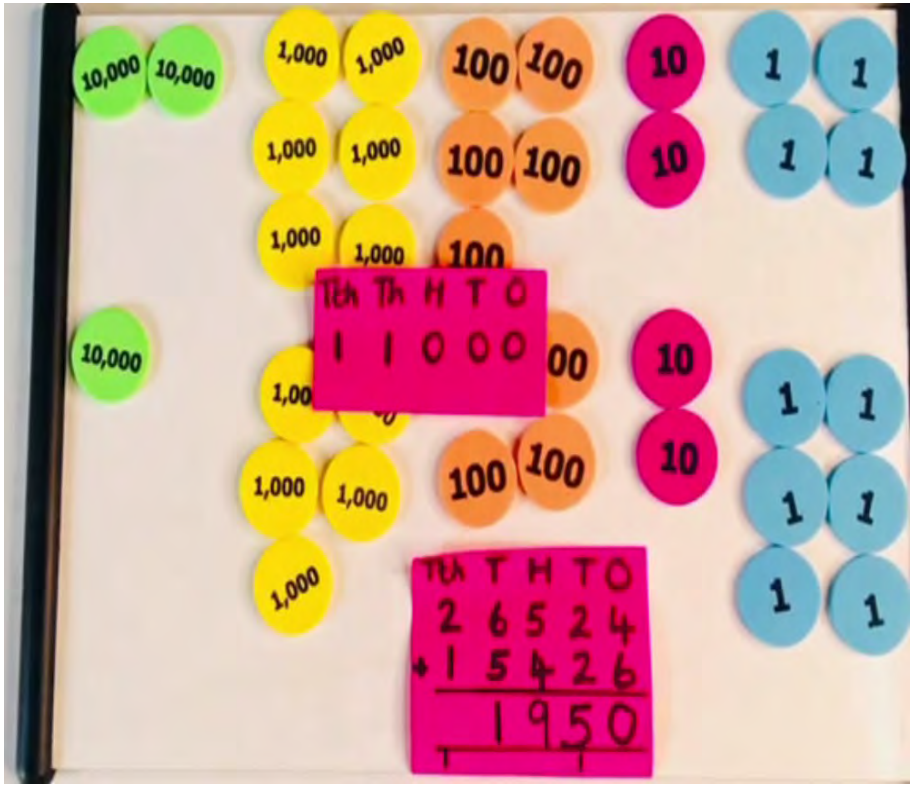

Addition using bar modelling

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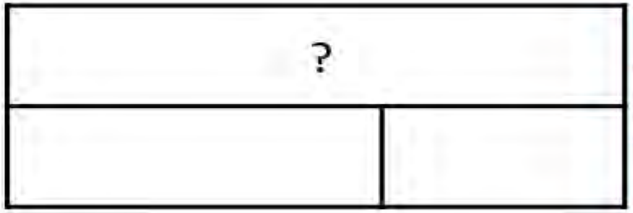
530,542 − 346,221 = 184,321



		Hth	TTh	Th	H	T	O	
		3	4	6	2	2	1	
	+	1	8	4	3	2	1	
		5	3	0	5	4	2	
		1	1					

Part + part = whole

Whole − part = part

Calculation Policy

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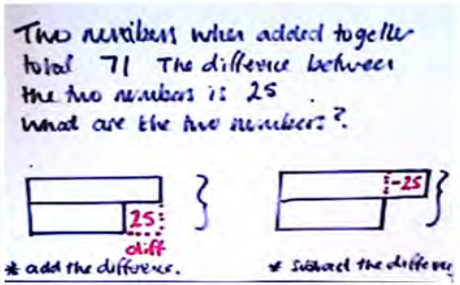
Year 6 - Addition

Concrete

- As above

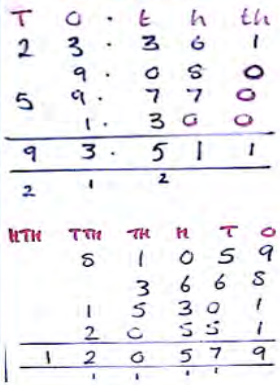
Pictorial

- Bar Models for Increasingly Complex Multi-Step Problems



Abstract

- Add several numbers of increasing complexity using Formal Columnar Addition



Oracy Sentence Stems:

The most efficient way to add these numbers is by ____ because ____

The calculation tells me I need to add the numbers.

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

____ million add ____ million is equal to ____.

When there are no brackets, division is completed before addition and subtraction.

Subtraction in Year 5 & 6

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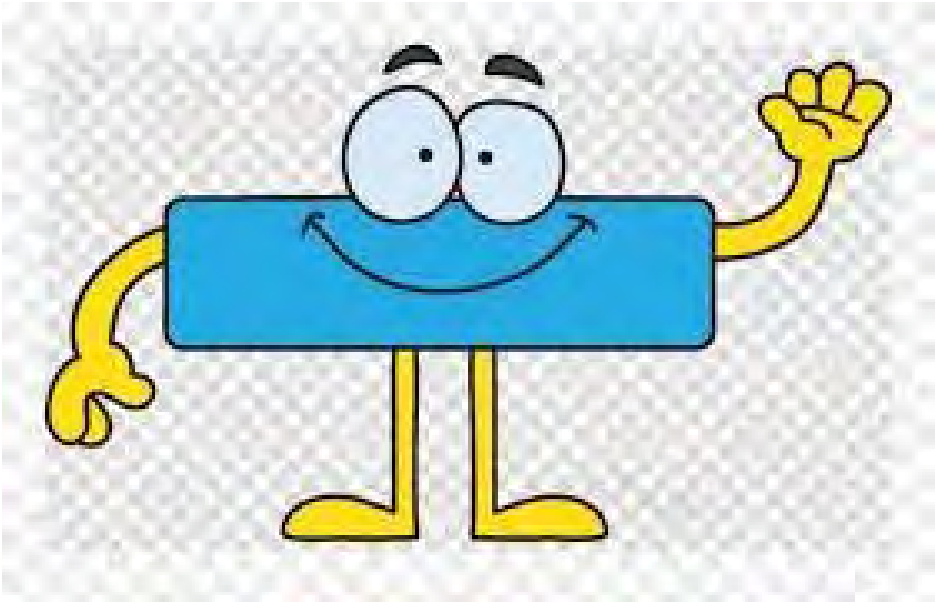

Calculation policy

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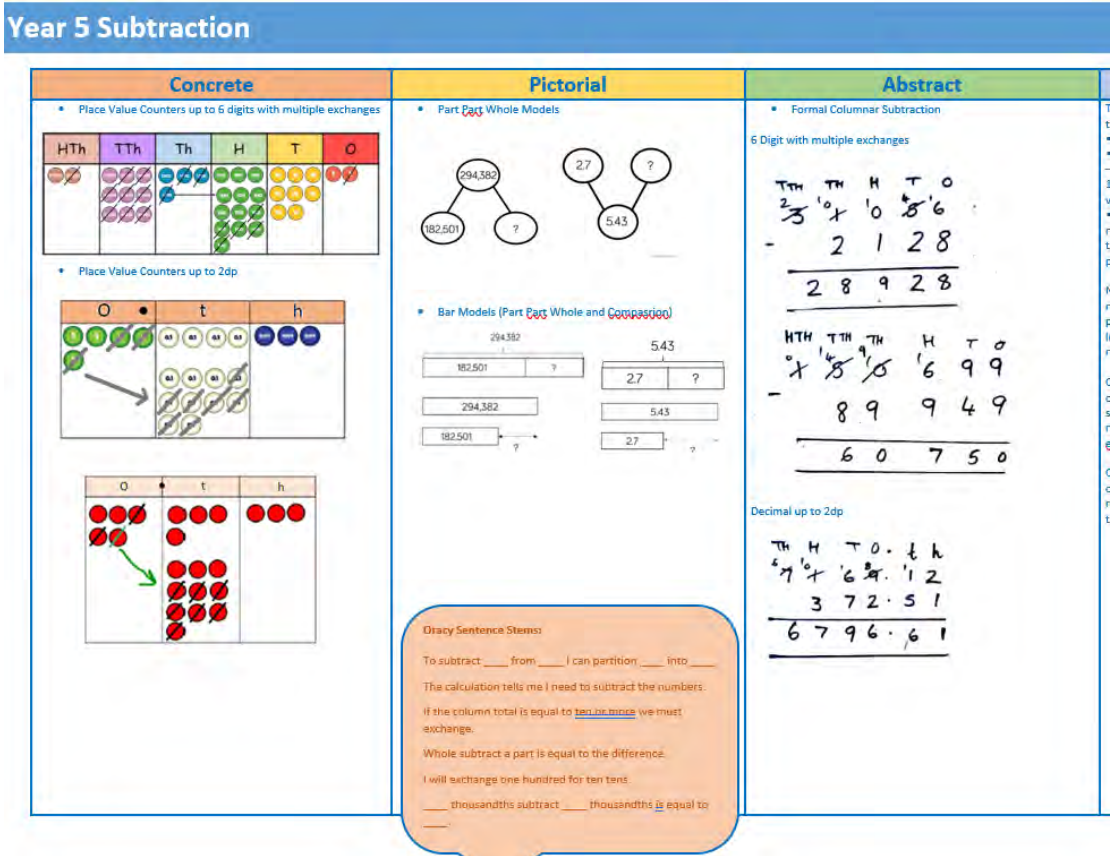
Formal column subtraction with up to 6 digit numbers.

Formal column subtraction With decimals with up to 2 decimal places.



Supporting understanding using manipulatives

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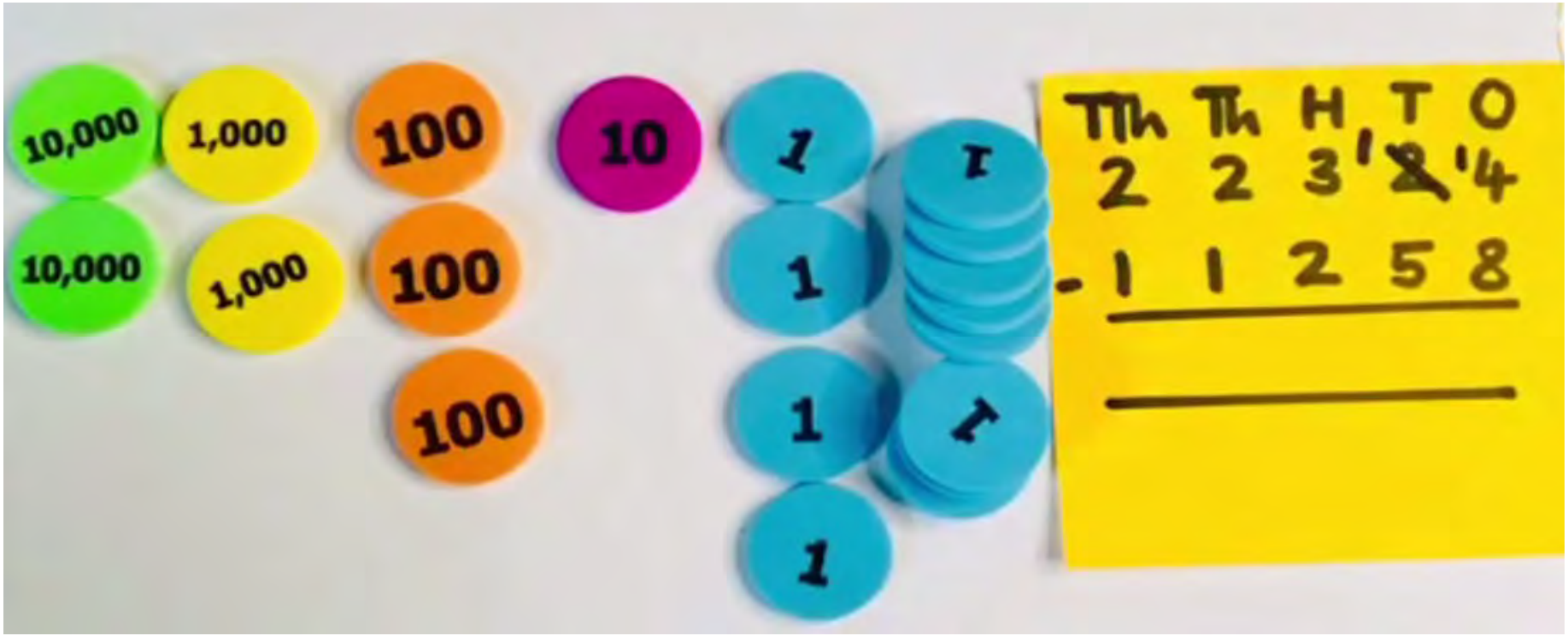

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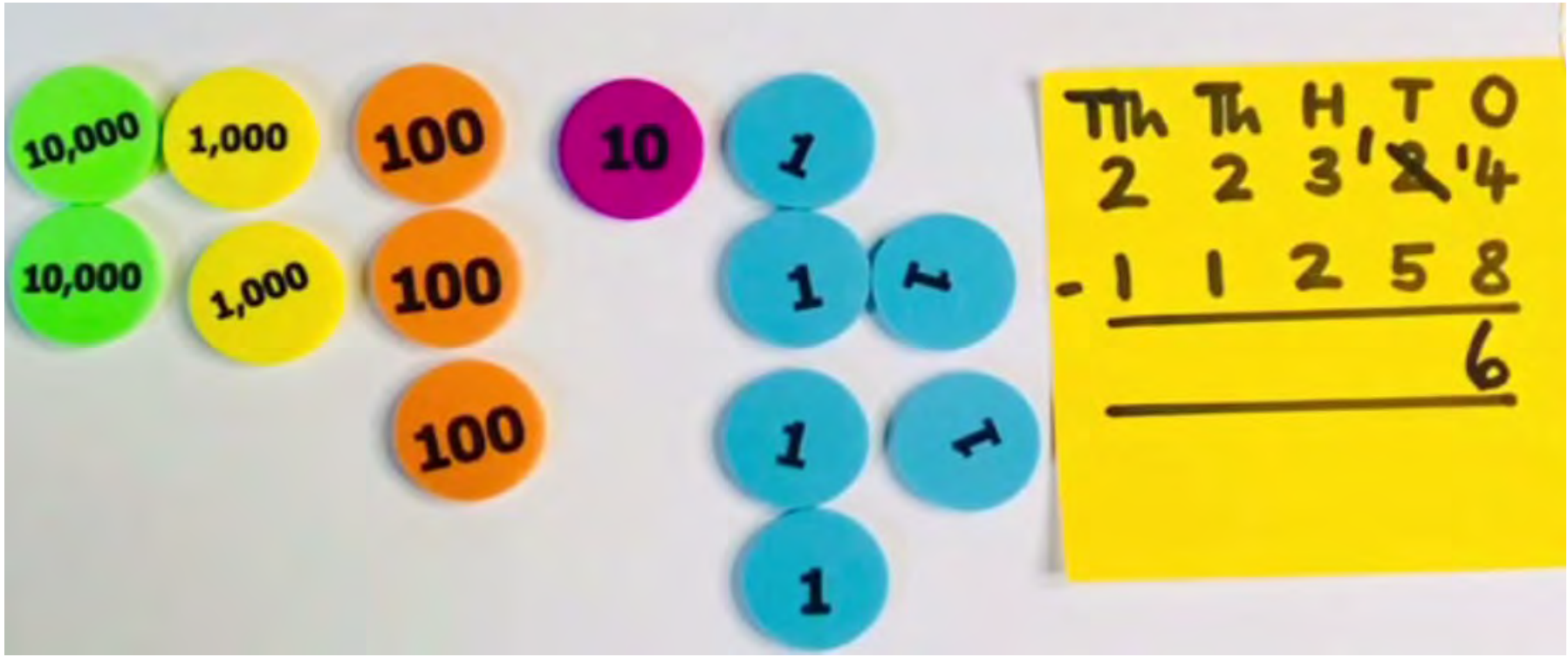

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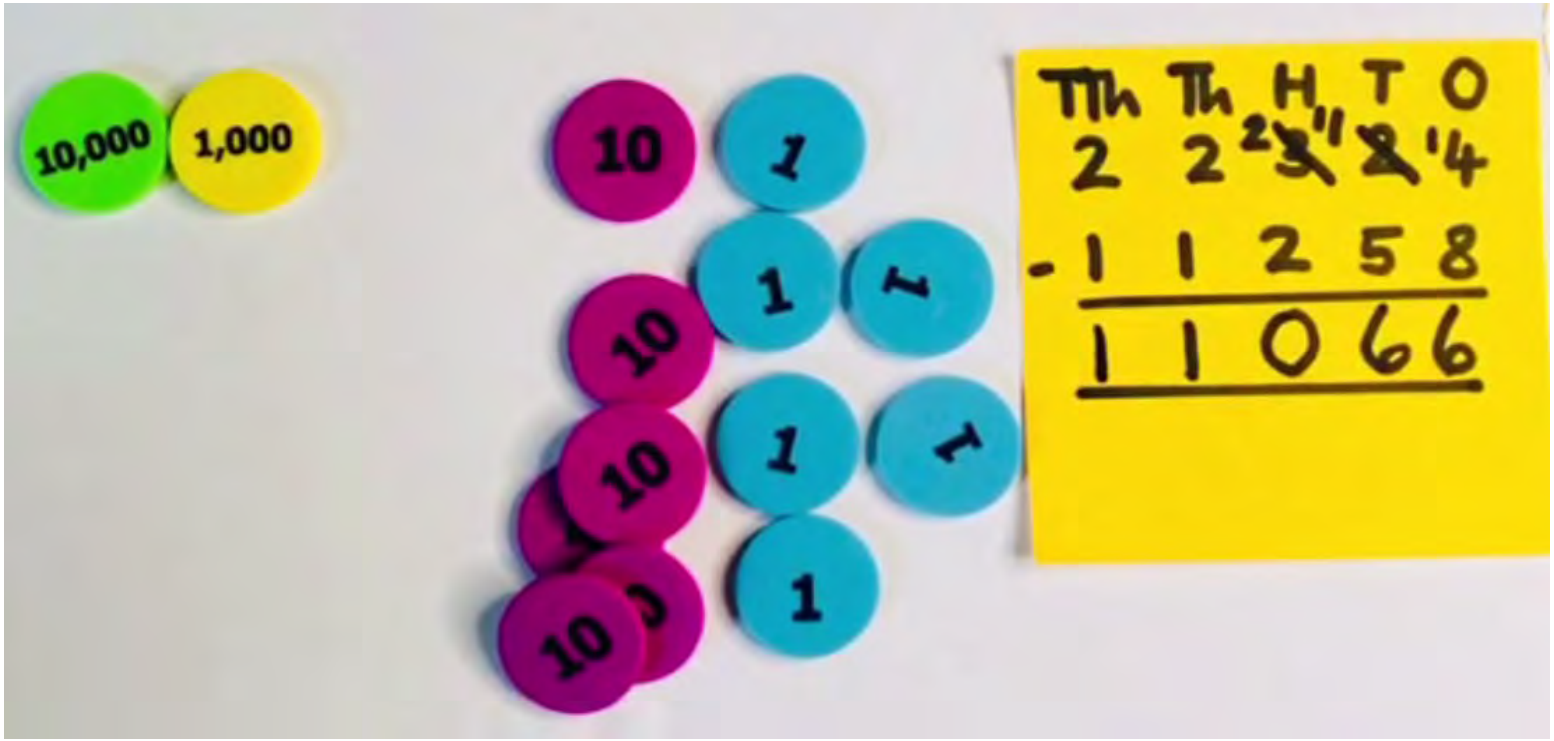

Calculation policy

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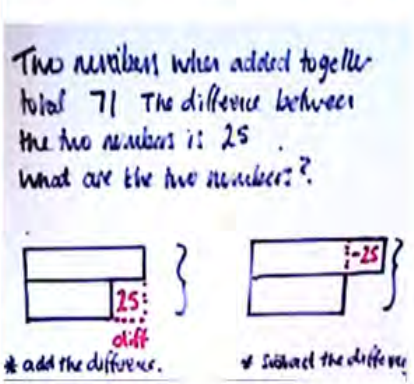
Formal column

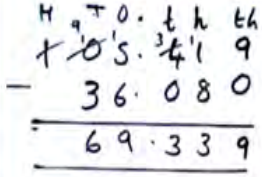
Subtraction with up to

7 digit numbers.

Year 6 – Subtraction

Concrete	Pictorial	Abstract
• As Above	• Bar Models for Increasingly Complex Multi-Step Problems	• Formal Columnar Subtraction up 7 digits





Oracy Sentence Stems:

When there are no brackets, division is completed before addition and subtraction.

The most efficient way to subtract these numbers is by ____ because ____

The calculation tells me I need to subtract the numbers.

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

____ million subtract ____ million is equal to ____.

Multiplication in Year 5 & 6

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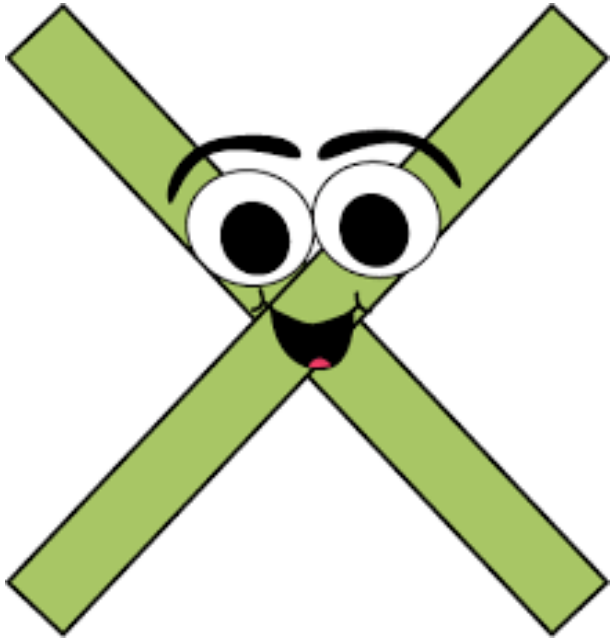

Calculation policy

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Grid method for up to 3 by 2 digit multiplication

Area model for 2 by 2 digit multiplication

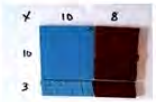
Moving onto formal column method

Year 5 – Multiplication

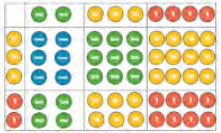
Concrete

- Place Value counters for 4 digits by 1 digit
  eg. 1826 x 3 = 5478

- Cuisenaire Rods and Base 10 for Area method: 3 digits by 2 digits
  eg. 13 x 18

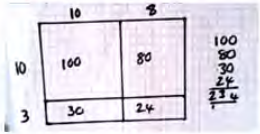


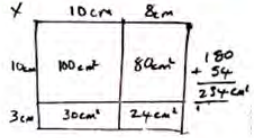
- Place Value Counters for Grid Method: 3 digits by 2 digits
  eg. 234 x 32



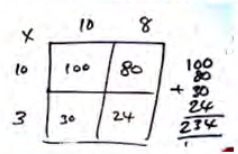
Pictorial

- Area Method for 2 digits by 2 digits (draw round Cuisenaire
  eg. 23 x 18





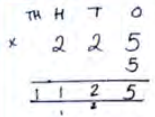
- Grid Method for 2 digits by 2 digits (not to scale)



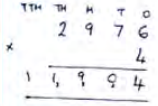
Abstract

- Formal Columnar Multiplication

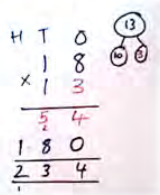
3 digit by 1 digit



4 digit by 1 digit



3 digit by 2 digit



Oracy Sentence Stems:

____ is a factor/multiple of ____ because ____ x ____ = ____

____ is a factor/multiple of ____ because ____ ÷ ____ = ____

Numbers that have more than two factors are composite numbers.

Numbers that have only two factors are called prime numbers.

____ is not prime because it has the factors ____

____ is prime because it only has two factors: 1 and itself.

____ squared is ____. The square root of ____ is ____

Place value counters for grid method

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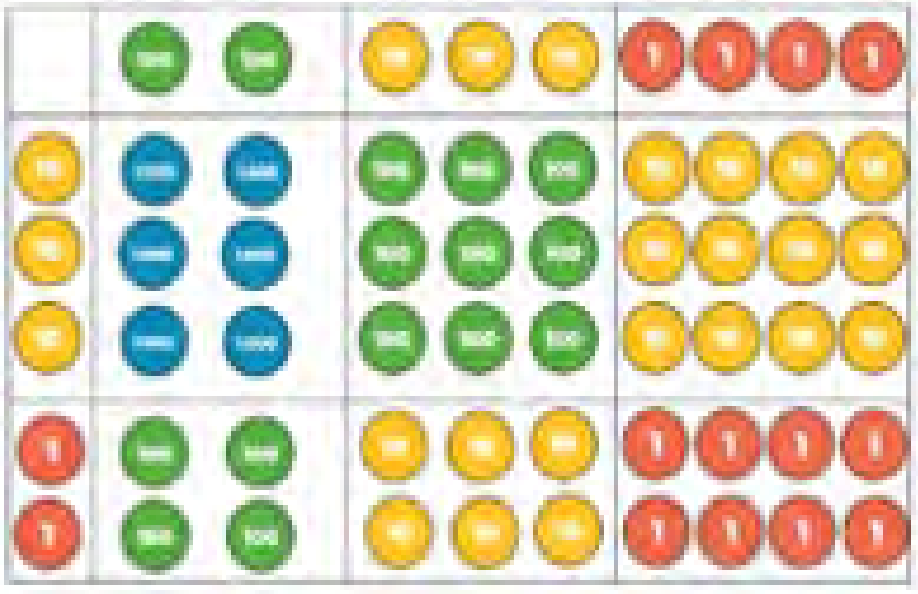
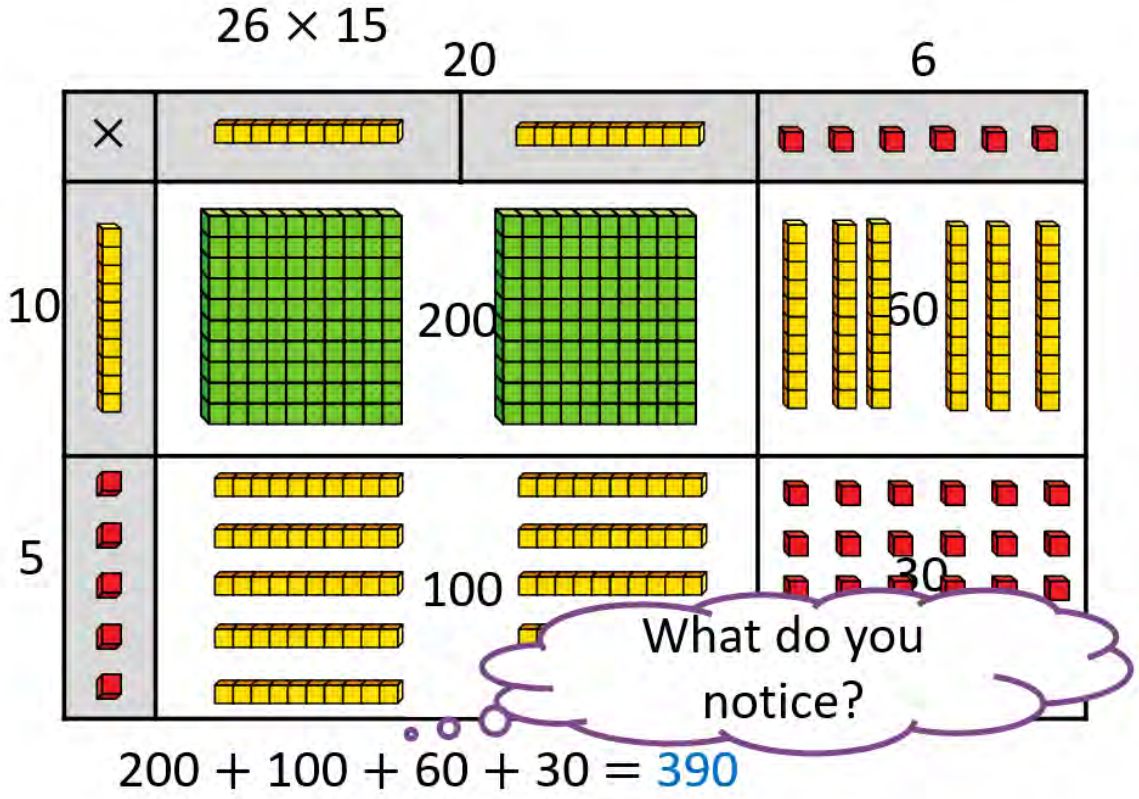
234 x 32



Area model



Formal column multiplication

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	TTh	Th	H	T	O
		2	3	4	2
×				2	1
		2	3	4	2
+	4	6	8	4	0
	4	9	1	8	2

1

Calculation policy

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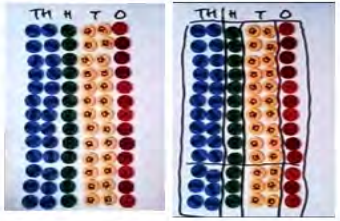
Grid method for up to 4 by 2 digit multiplication

Moving onto formal column method and multiplication of decimals

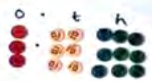
Year 6 – Multiplication

Concrete

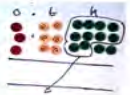
- Place Value Counters for Grid Method: 4 digits by 2 digits
  eg. 2121 x 13



- Place Value Counters for Grid Method: Decimals
  eg. 1.23 x 3 (no exchange)



eg. 1.24 x 4 (exchange)



Pictorial

- Grid Method
  eg. 2134 x 13

Oracy Sentence Stems:

If ____% of my number is ____, then I need to multiply it by ____ to find the full amount.

When a number is multiplied by ____ the digits move ____ places to the ____.

When a number is multiplied by one thousand, the digits move three places to the left.

If one factor is made ten times the size, the product will be ten times the size.

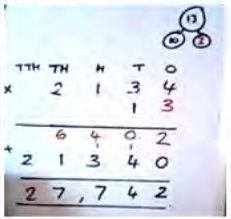
If I double one factor, I must double the product.

If I multiply one factor by ____, I must multiply the product by ____.

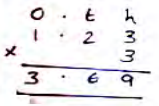
Abstract

- Formal Columnar Multiplication

4 digit by 2 digit



Decimal



Division in Year 5 & 6

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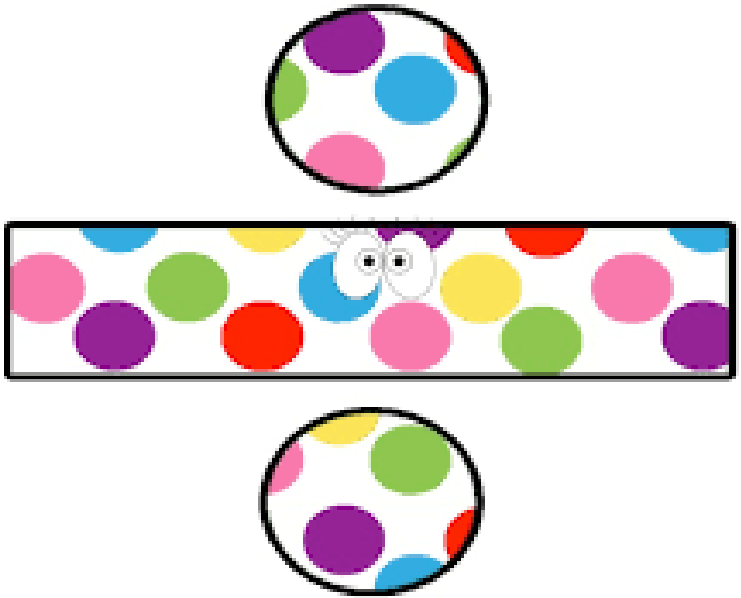

Calculation policy

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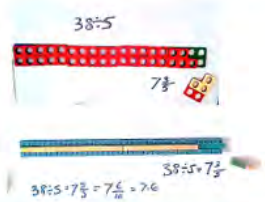
Year 5 – Division

Concrete

- Continued use of Numicon and Cuisenaire tracks to illustrate remainders bigger than 0 as whole numbers and fractions

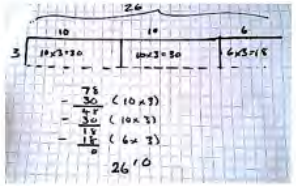


- Place Value Counters for 4 digit ÷ 1 digit
  eg. 8532 ÷ 2 (focus on language of grouping and exchange)

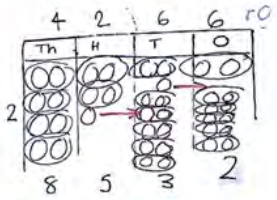
Pictorial

- Number lines

- Use of Area Method of Division



- Represent Place Value Counters (focus on language of grouping and exchange)



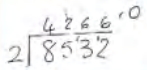
- Bar modelling for multiples

Abstract

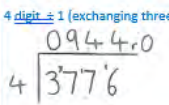
- Formal Short Division

Consolidation of Year 4 and then moving to:

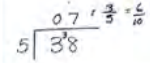
4 digit ÷ 1 (exchanging twice and a remainder of 0)



4 digit ÷ 1 (exchanging three times and a remainder of 0)



Remainders greater than 0 shown as whole numbers and fractions



Oracy Sentence Stems:

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

The remainder is always less than the divisor.

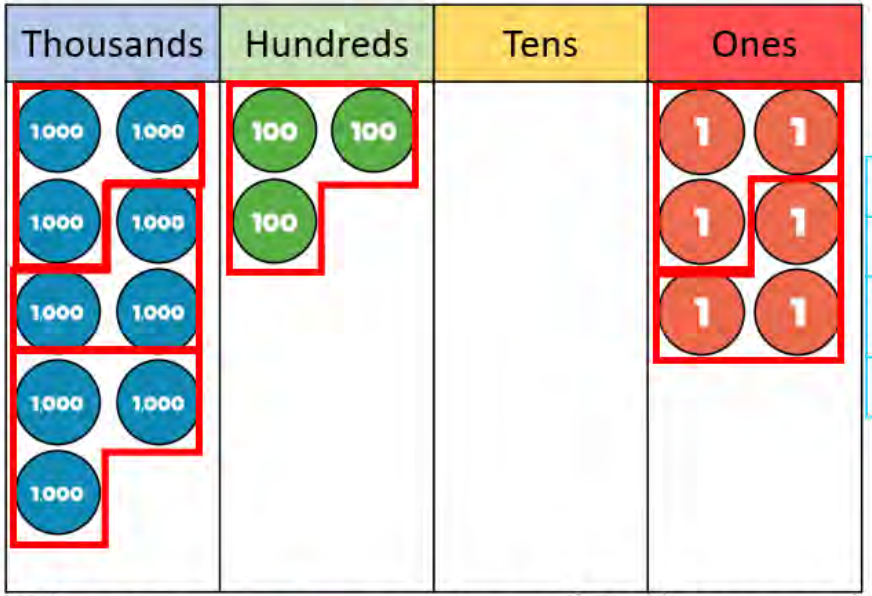
How many groups of 2 thousand are there in 8 thousand? There are 4 groups of 2 thousand in 8 thousand. How many groups of 2 hundred are there in 5 hundred? There are 2 groups of 2 hundred in 5 hundred. I will exchange the remaining 1 hundred for 10 tens. I now have 13 tens. How many groups of 2 tens are there in 13 tens? There are 6 groups of 2 tens in 13 tens. I will exchange the remaining ten for 10 ones. I know have 12 ones. How many groups of 2 ones are there in 12 ones? There are 6 groups of 2 tens in 12 tens. There is a reminder of 0.

Use number lines and place value counters to focus on language of grouping and exchange

Formal short division method.

Children interpret remainders as fractions and decimals.

Division using place value counters



3102
3 9306

There are _3_ groups of 3 thousands.
There is _1_ group of 3 hundreds.
There are _0_ groups of 3 tens.
There are _2_ groups of 3 ones.

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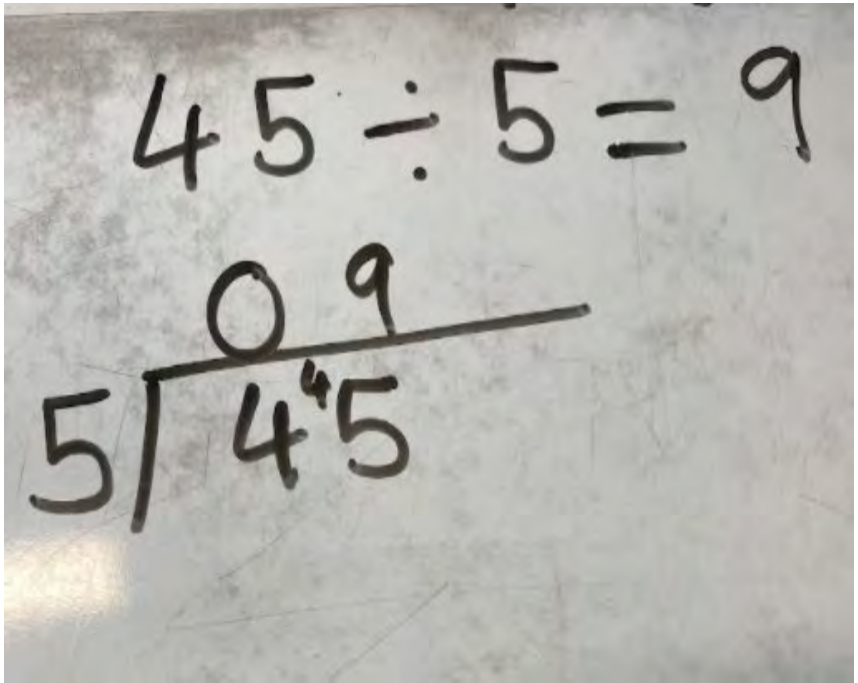
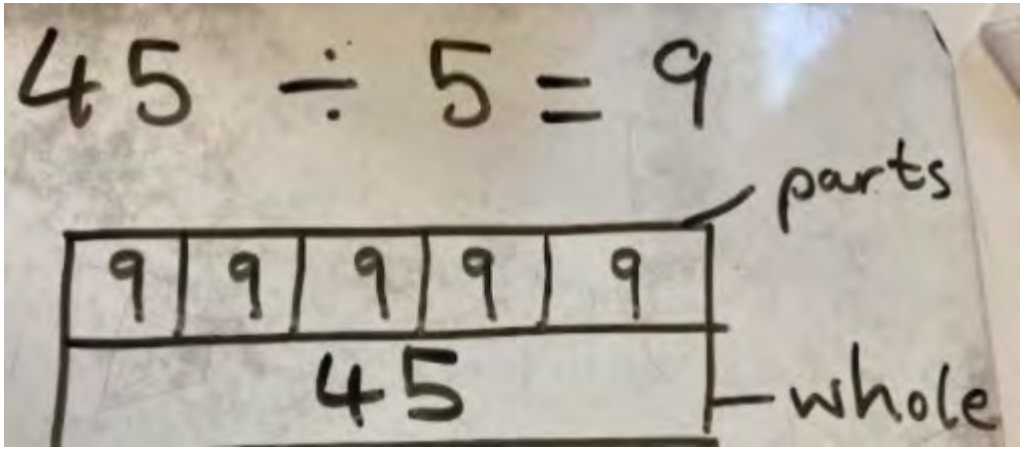
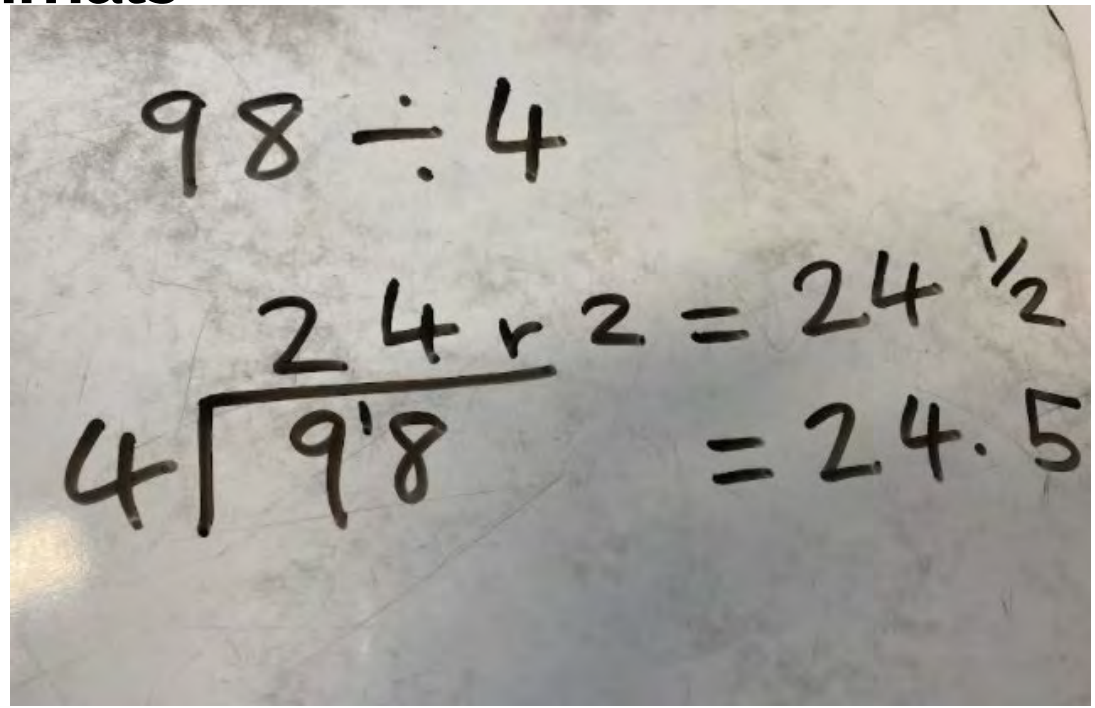
Short division



Bar model representation



Representing remainders as fractions and decimals



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Calculation policy

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Formal long division.

Year 6 – Division

Concrete

- Place Value counters used to consolidate the language of grouping and exchange for short and long division

Oracy Sentence Stems:

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

The remainder is always less than the divisor.

How many groups of 4 thousand are there in 8 thousand? There are 2 groups of 2 thousand in 8 thousand. I have no thousands remaining.

How many groups of 4 hundred are there in 4 hundred? There is 1 group of 4 hundred in 4 hundred. I have no hundreds remaining.

How many groups of 4 tens are there in 4 tens? There is 1 group of 4 tens in 4 tens. I have no tens remaining.

How many groups of 4 ones are there in 8 ones? There are 2 groups of 4 ones in 8 tens. I have no ones remaining.

Pictorial

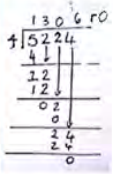
- As above

Abstract

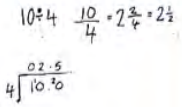
- Consolidation of Short Division (See Year 4 and 5)
- Formal Long Division

4 digit ÷1 digit (remainder of 0)

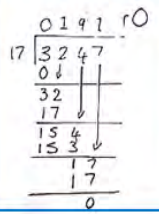
4 digit ÷1 digit (Use of 0s)



Remainders as fractions and decimals



4 digit ÷ 2 digit (Divisors greater than 12)



Long division

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Calculate 359 ÷ 16 = 22 r7

16	32	48	64	80	96	112	128	144	160

		2	2
16	3	5	9
–	3	2	↓
		3	9
–		3	2
			7

Manipulatives- concrete resources

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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

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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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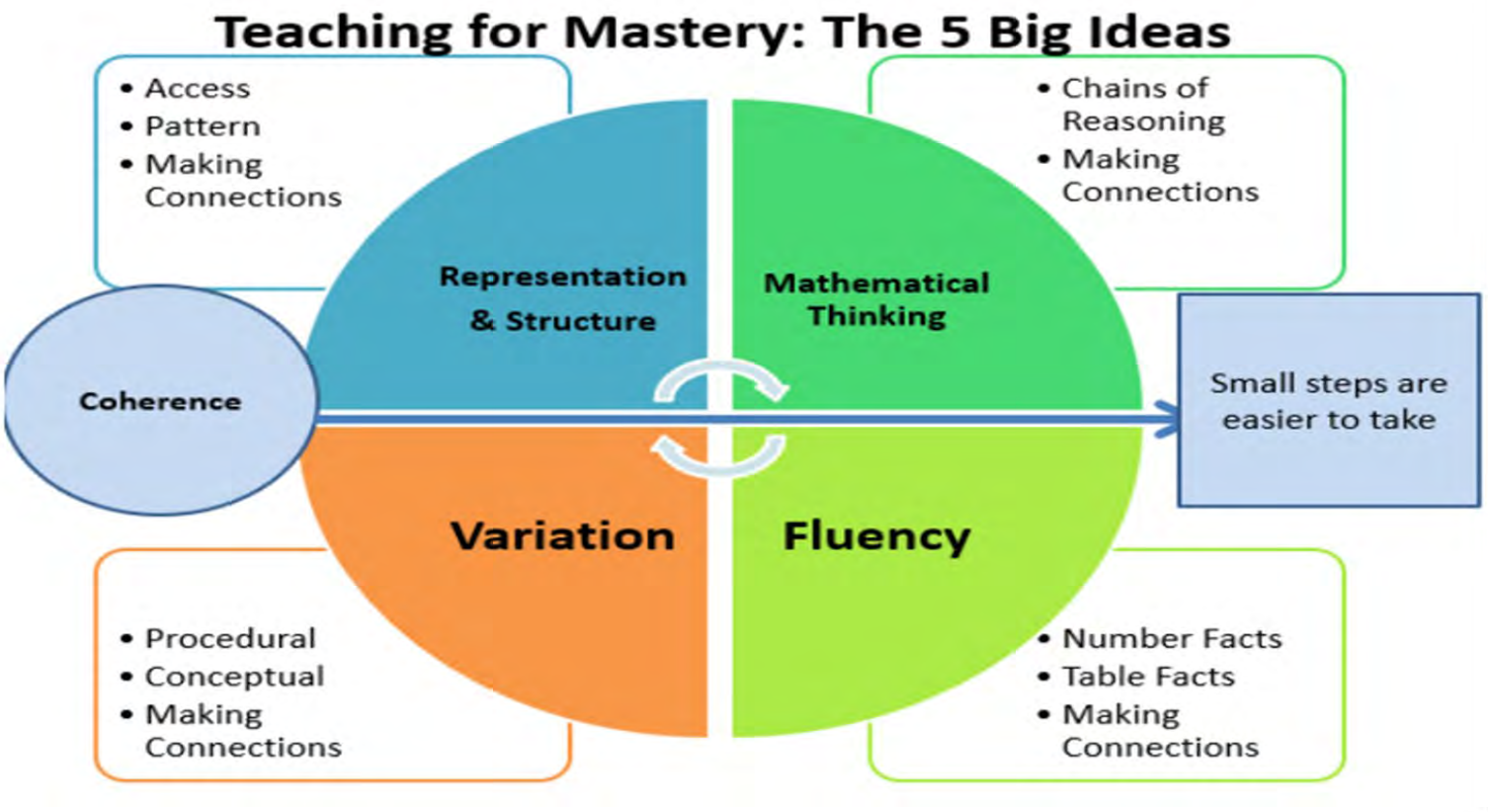

Making generalisations

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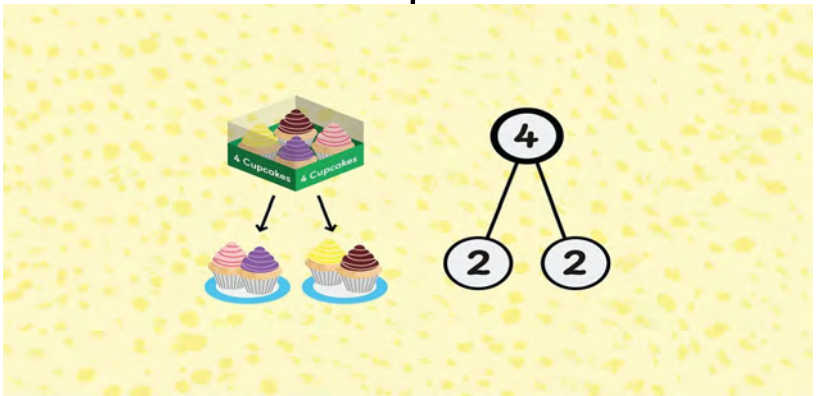
- Representations are used in lessons to expose the mathematical structure being taught.
- In essence representation refers to the wide variety of ways to capture an abstract concept or relationship.



clipboard(7).

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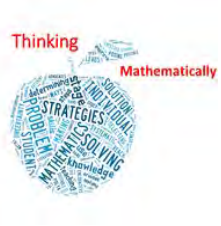
Multiple representations of the same number.

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

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: Spotting mistakes and misconceptions

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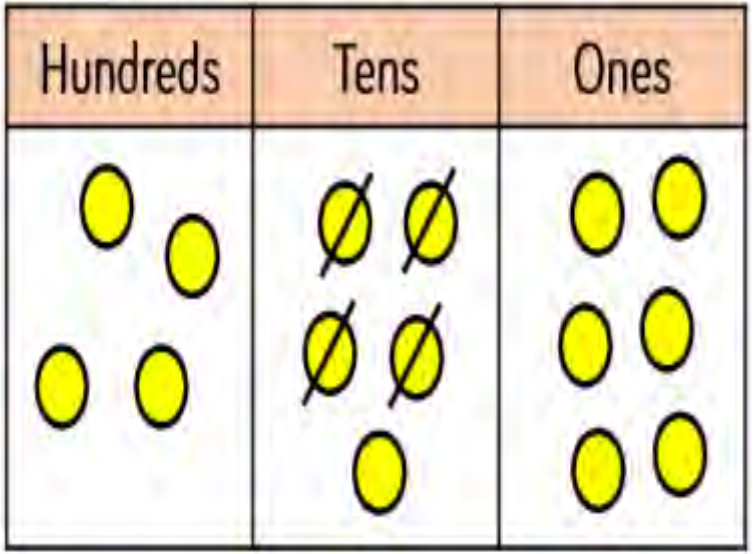
Alex thinks the chart shows 456 – 4

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?

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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?

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Reasoning: Always, sometimes or never true?

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

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- 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?

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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

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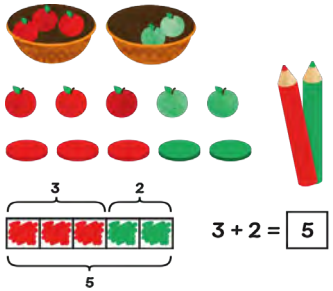

- This is about all about how the teacher represents the concept being taught
- An opportunity to work on different representations of the same mathematical idea.
- These multiple representations will 'showcase' to pupils the different conceptual ideas that underpin a mathematical idea.

Variation helps visualisation

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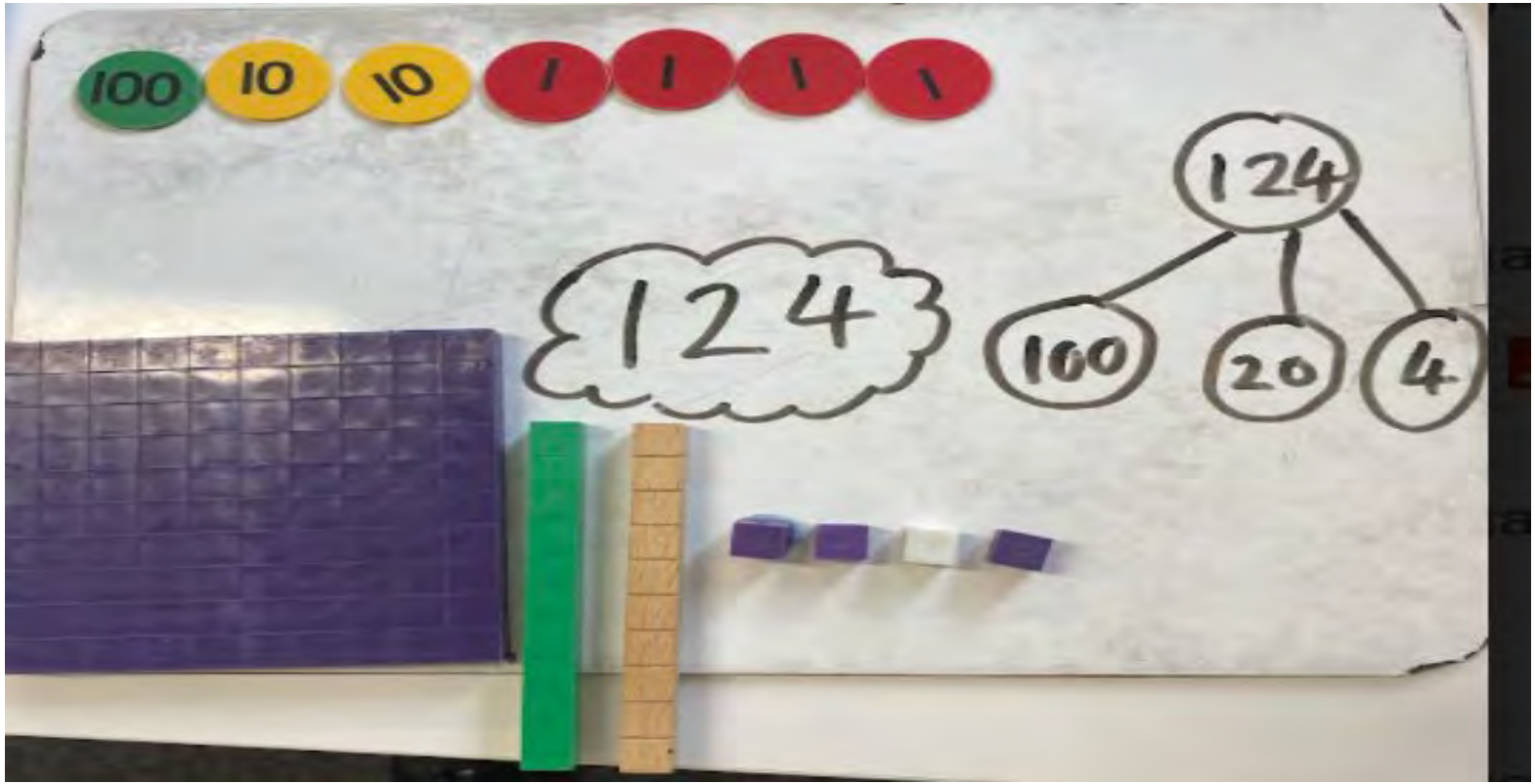

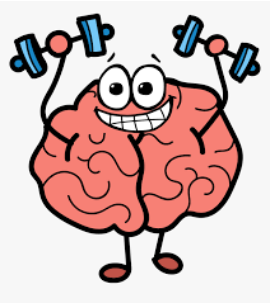

Everyone Can!

I can learn from my mistakes.

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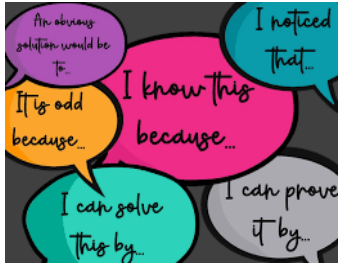
At Enfield Heights we encourage children to develop a **growth mindset** by using these strategies:

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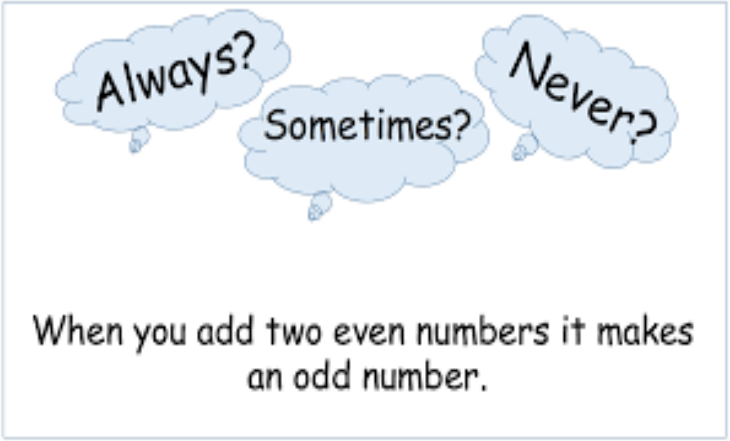
- Why is that a good mistake?
- If we know this, what else do we know?
- Give me . . .tell me . . .show me . . .
- Why is this the odd one out?
- The answer is . . .what is the question?
- Give me a silly answer for . . .?
- Always, sometimes, never true?



Any questions?

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