Maths mastery in KS2

Wednesday 2nd October 2024

- Mastering maths means pupils acquiring a deep, long-term, secure and adaptable understanding of the subject.

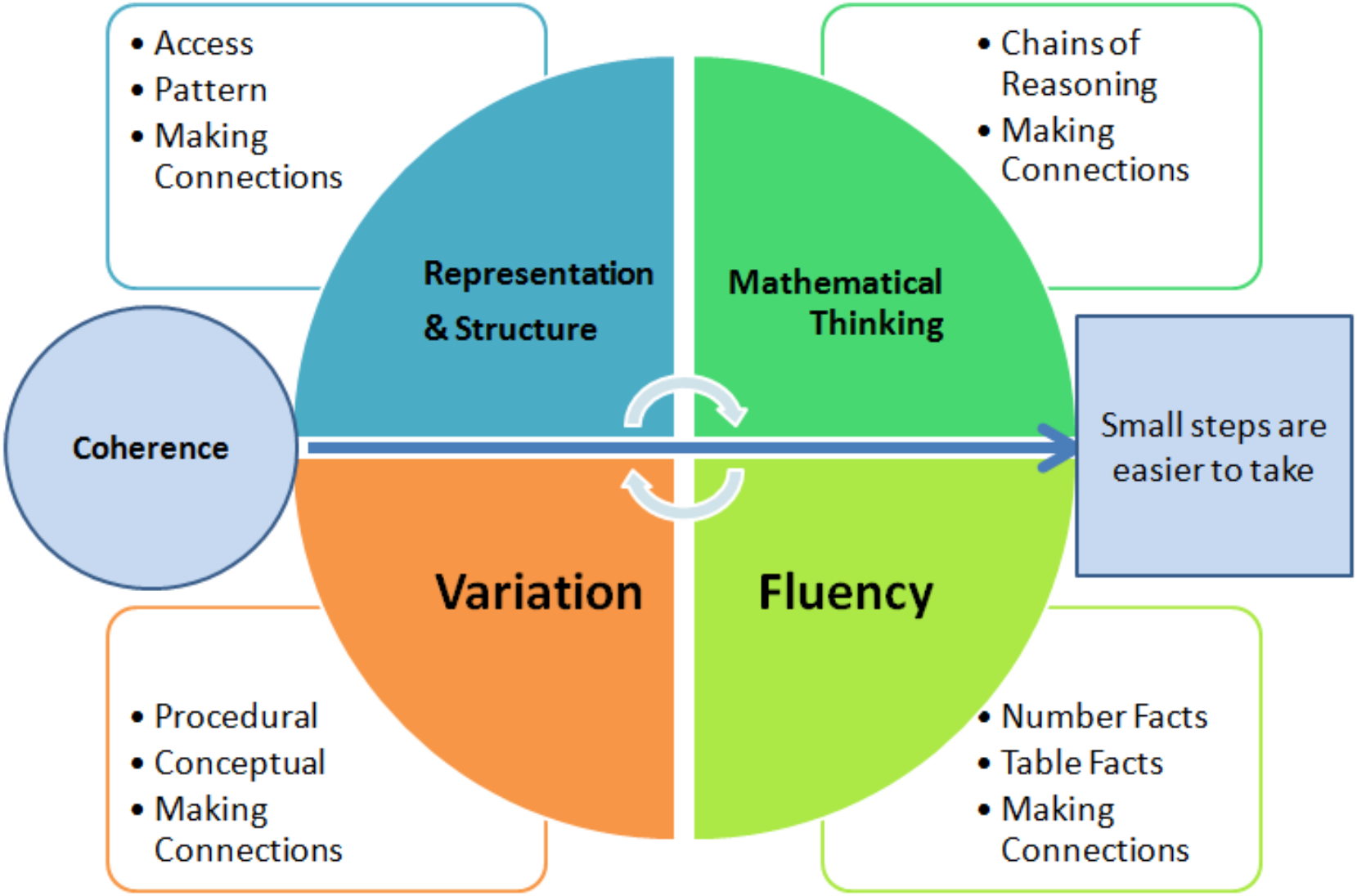
- The phrase ‘teaching for mastery’ describes the elements of classroom practice and school organisation that combine to give pupils the best chances of mastering maths.

- Achieving mastery means acquiring a solid enough understanding of the maths that’s been taught to enable pupils to move on to more advanced material.

Our aim

- To explore the 5 key areas for teaching for mastery
- To equip you with some skills to help support your child in their understanding of Maths.

How do we teach for mastery?



How do we teach for mastery?

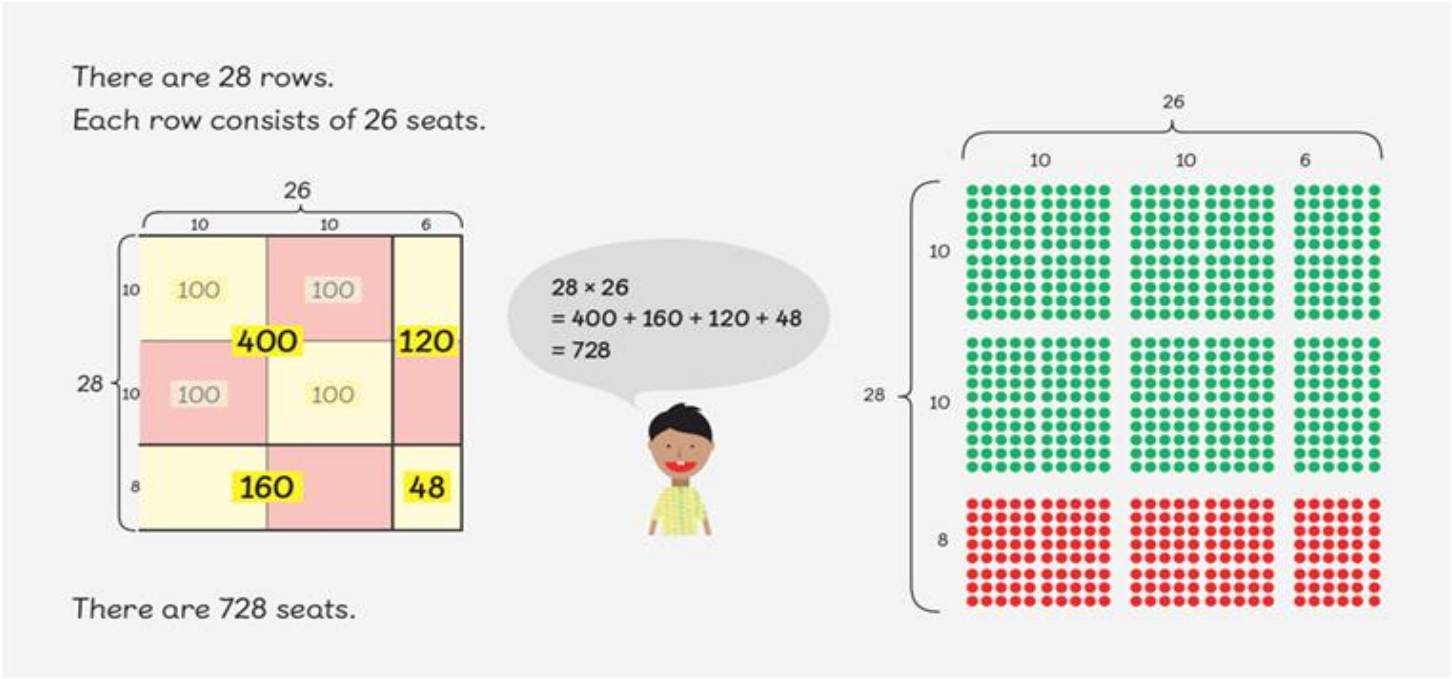
Representation and structure

Representation and structure is used to expose the mathematical structure being taught with the aim being that children will be able to move on to doing the maths without recourse to the representation.

This can be concrete or pictorial representation and should not be limited to KS1 only.

How can we help?

Use household objects and encourage children to draw representations.



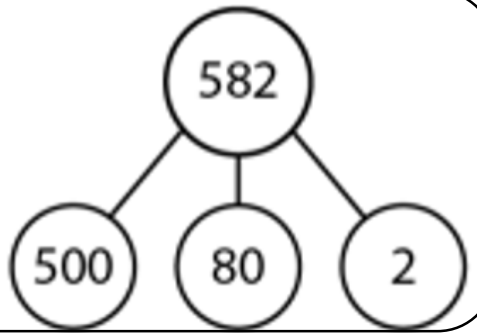
How do we teach for mastery?

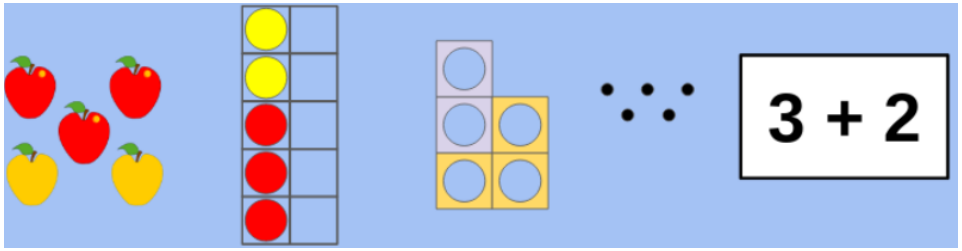
Representation and structure

Numerical and linguistic representations- stem sentences and correct vocabulary

Using the correct resources

There are _____ hundreds.
There are ____ tens.
There are ____ ones.
Altogether, there are_____.





There are ____ hundreds, ____ tens and ____ ones. The number is ____

_____ = ____ + ____ + ____

The difference in value between the start and end point is 1,000,000
There are 10 intervals.
The number line is counting up in 100,000s

1,000,000 ÷ 10 = 100,000

How do we teach for mastery?

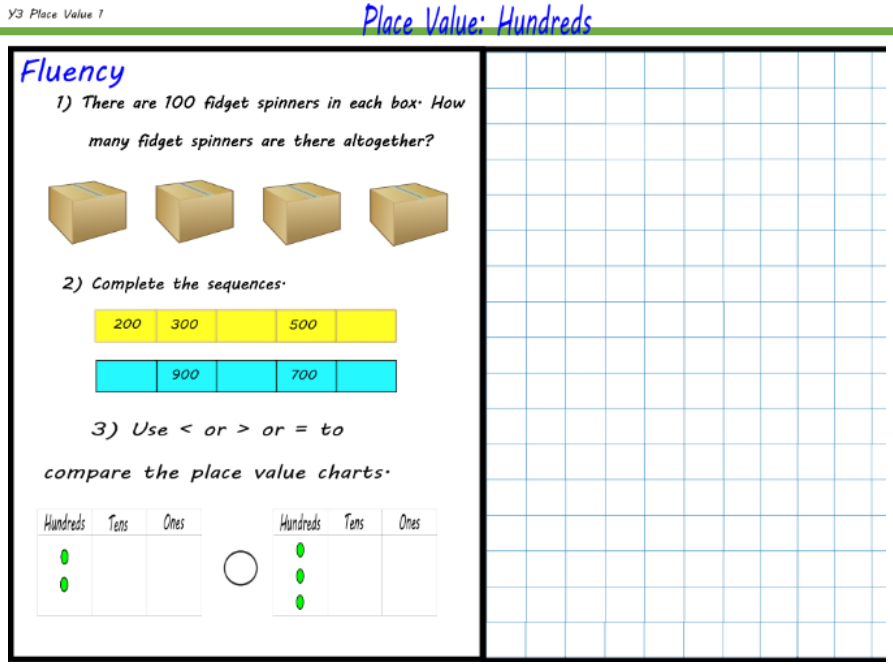
Fluency

Fluency is more than just rapid recall of number facts. It also encompasses efficiency, accuracy and flexibility.

Fluency demands the flexibility to move between different contexts and representations of mathematics, to recognise relationships and make connections and to make appropriate choices from a whole toolkit of methods, strategies and approaches.

How can we help?

Discuss different methods with children. Explore relationships between numbers.



How do we teach for mastery?

a) 400 + 300

430 + 300

439 + 300

300 + 477

b) 700 – 200

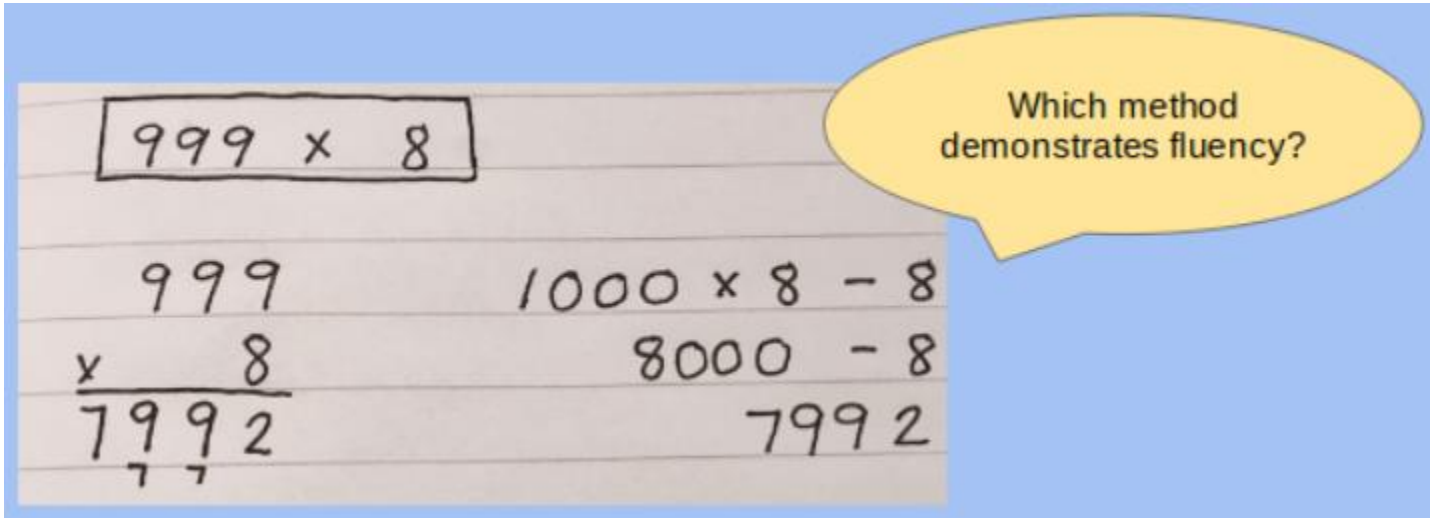
780 – 200

783 – 200

701 – 200

What do these mean?
Automaticity
Subitising

Write down what patterns you notice.



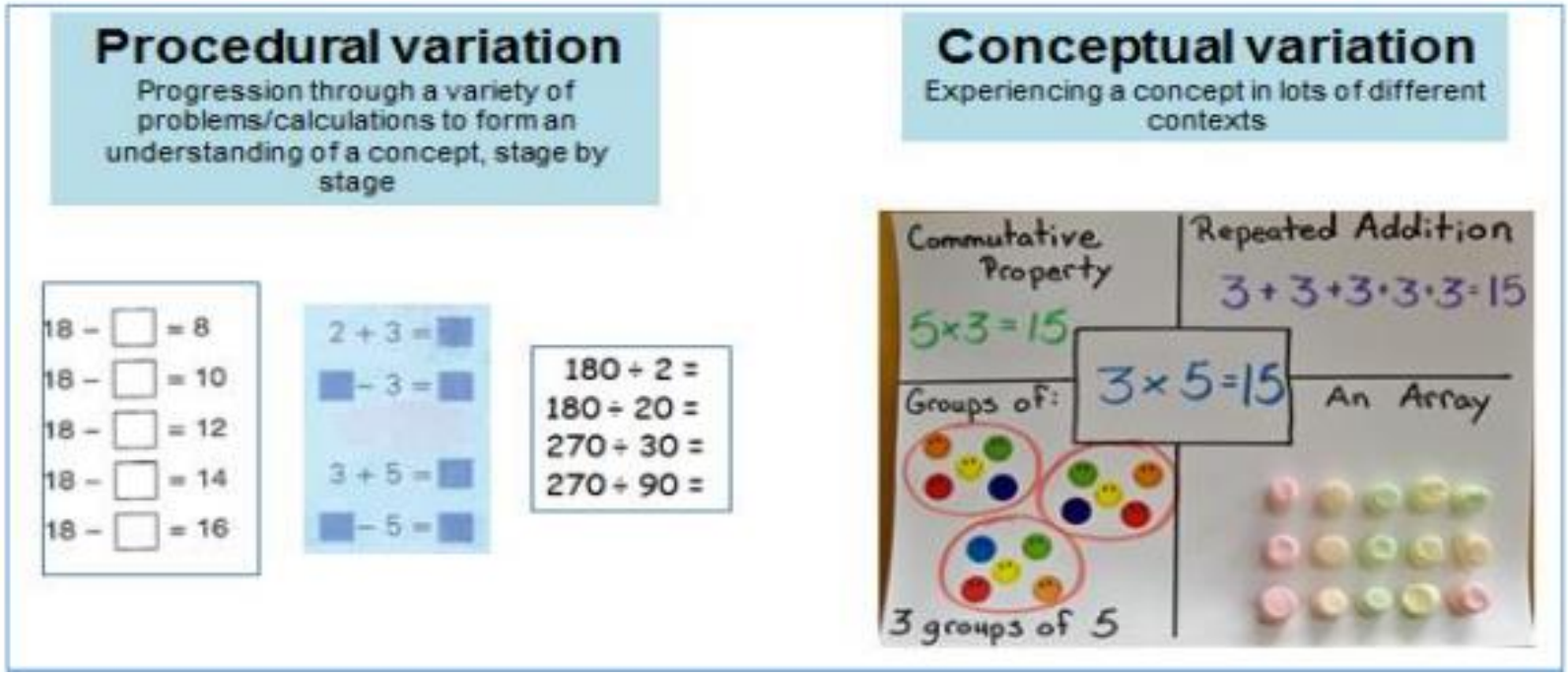
How do we teach for mastery?

Variation

Variation highlights the essential features of a concept or idea by varying the non-essential features.

To emphasise variation, it is important to show children - What the mathematical concept is
- What the mathematical concept is not

When constructing a set of activities/questions, it is important to consider what connects the examples; what mathematical structures are being highlighted?



How do we teach for mastery?

procedural variation

7 x 4
70 x 4
70 x 8
14 x 4
140 x 40

If I know this…..

Then I know this……

How do we teach for mastery?

Mathematical Reasoning

For children to understand a taught concept deeply, they must be able to *work on* that taught concept. This will look like a child thinking about, reasoning with and discussing that concept with others.

How can we help?

- Ask questions that require children to reason, “What is the same? What is different? What patterns can you see?”
- Ask children to explain, convince/prove, draw diagrams or use manipulatives to illustrate an idea or strategy.

Explore

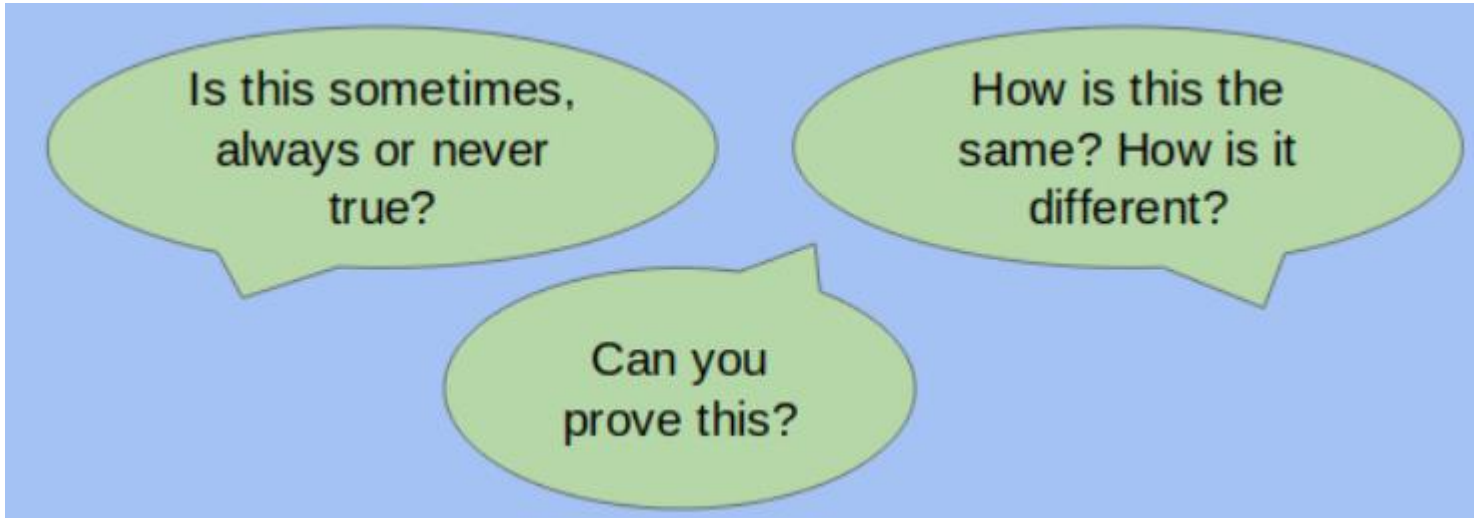
A and B are whole numbers.

Rounded to the nearest 100, A is 500

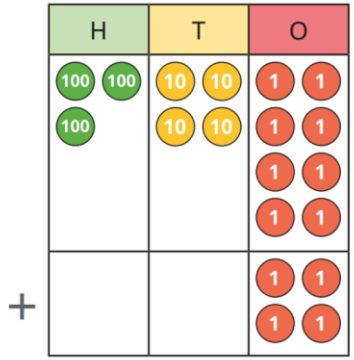
Rounded to the nearest 10, B is 350

What is the smallest possible difference between A and B?

How do we teach for mastery?

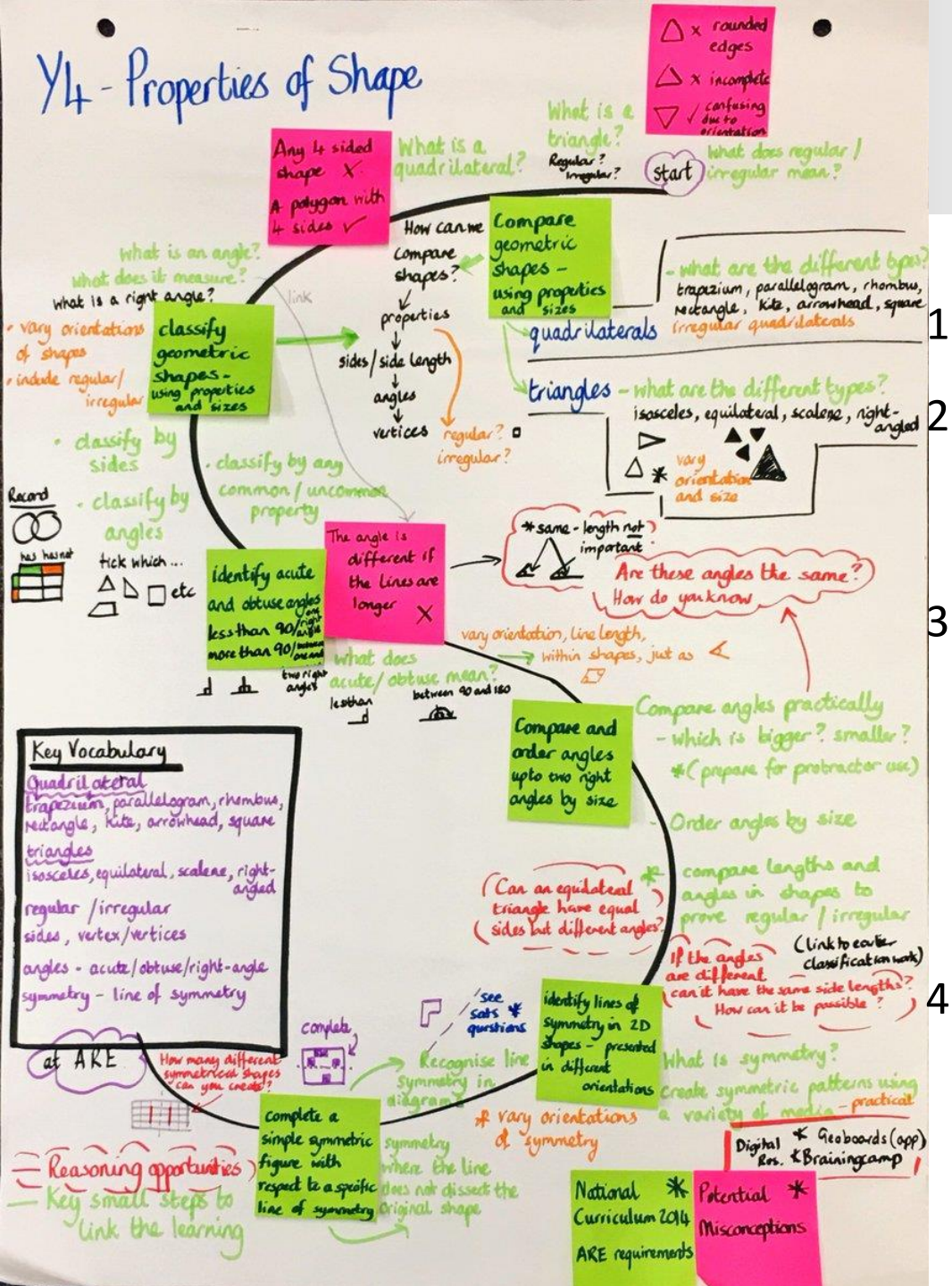


A Answer
B Because
C Convince



Draw this place value grid in your book and explain what you need to do to complete the calculation.

What column will definitely change, maybe change and never change?



Coherence

1. Small steps are easier to take.
2. Focusing on one key point, each lesson allows for deep and sustainable learning.
3. Certain images, techniques and concepts are important pre-cursors to late ideas. Getting the sequencing of these right is an important skill in planning and teaching for mastery.
4. When something has been deeply understood and mastered, it can and should be used in the next steps of learning.

Addition - Vocabulary

43 + 7 = 50

Addend

Addend

Sum

Why do we need to use these words?

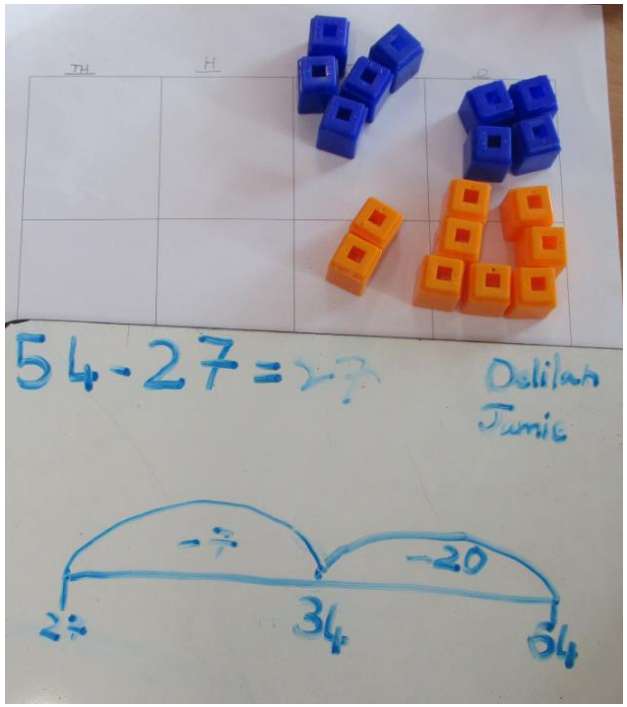
Subtraction - Vocabulary

43 - 7 = 36

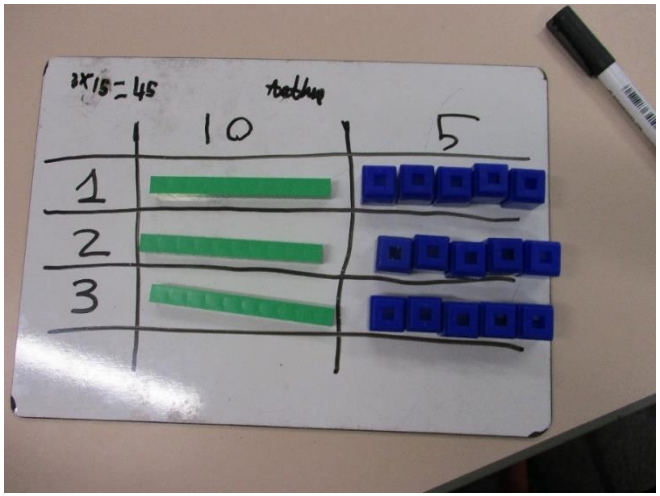
Minuend

Subtrahend

Difference



Multiplication - Vocabulary



43 X 7 = 301

Multiplicand (Factor)

Multiplier (Factor)

Product

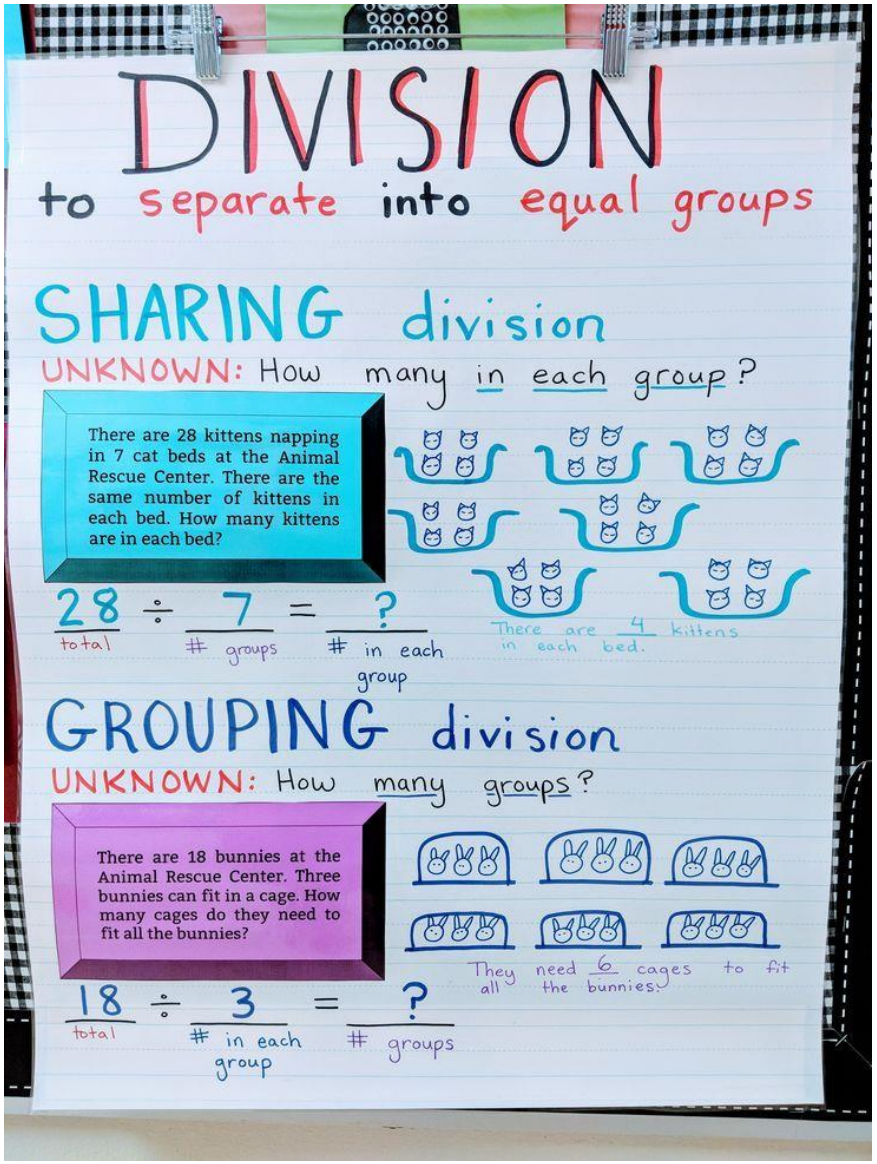
<u>3 Laws</u>

Commutative Law
Distributive Law
Associative law

Division - Vocabulary

$42 \div 7 = 6$

Dividend — Divisor — Quotient



Bridge 10

Talk Task

Which questions are easy, which are hard?

453 + 10 =	930 – 100 =
493 + 10 =	910 – 120 =

Why are some easy and some hard? Explain your reasons.

Greater depth

• Archie and Sophie are both working out the answer to the following question:

350 + 278 + 250

They have both used different strategies.

Archie's method	Sophie's method
350+ 278+ 250	350+278+250
350+ 278= 628	350+250= 600
628 + 250= 878	600+ 278= 878
Answer = 878	Answer= 878

Which do you prefer? Explain why.
Use the method you preferred to solve
320+ 458 + 180

The sea level is usually taken as zero.
Look at the picture of the lighthouse.
If the red fish is at –5 m (5 metres below sea level):
Where is the yellow fish?
Where is the green fish?

Can you draw a fish at –35 m?

Can you draw a seagull at 20 m above sea level?

What would the position of your fish and the seagull be if each of the intervals on the lighthouse represented 7 m?

Non-negotiables by end of LKS2

Multiplication

By the end of Year 4, children should be fluent in their multiplication up to 12 x 12.

This will provide a strong foundation for them as they move on to UKS2.

More complex multiplication

25 x 19 = ?

If 25 x 19 = 475, how can we use that to work out 27 x 19 = ?

If 25 x 19 = 475, how can we use that to work out 525 = 25 x ?

Reason your answer carefully.

Reasoning

I know… so…

$25 \times 48 = \_\_\_\_\_$

$100 \times 48 = 4800$

$\_\_\_\_ \times 48 = 4848$

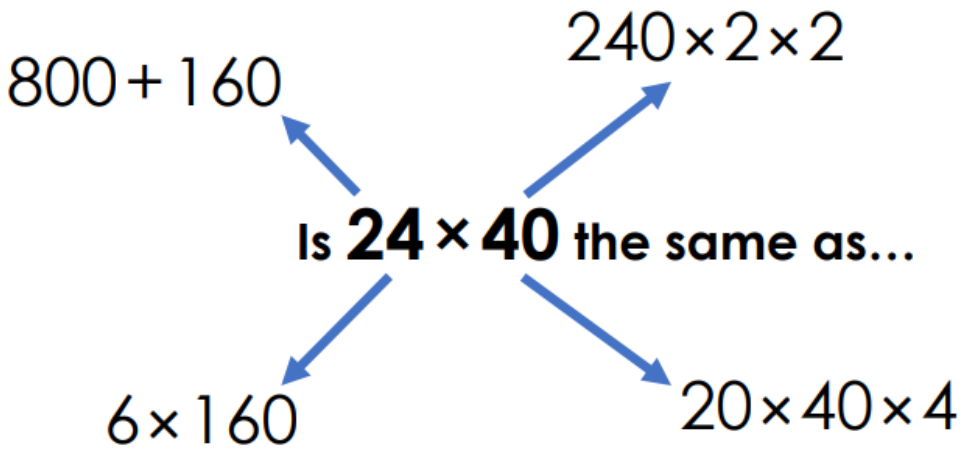
True or false?

$17 \times 13 = 15 \times 15$

What do you notice?

Try other examples. Do you see a pattern?

Is it the same?



Vocabulary

- Exchange/regroup
- calculation
- number sentence
- oblong 

hundreds tens ones
H T 1's

digit → **62**

number **62**

- borrow or steal
- sum = total
- rectangle (family name) 
- units

Useful Links

NCETM National Centre for Excellence in the Teaching of Mathematics
https://www.ncetm.org.uk/

Nrich
http://nrich.maths.org/frontpage

I See Reasoning
https://www.iseemaths.com/i-see-reasoning-ks1/