Maths Subject Leadership meeting

H.E.P.

08.11.2022

Welcome and Introductions

- Name
- School
- Role and year group you are working in

Etiquette for virtual meetings

- Please ensure you are muted when the speaker/another participant is speaking.
- Please keep cameras on.
- Please use the chat function for questions or un-mute yourself to ask questions.
- Please be as active as possible to make this worthwhile.

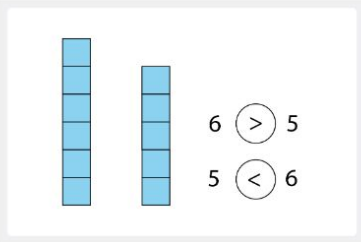
Agenda

- Welcome and introductions
- Subject resources and update
- Teaching for Mastery
- Breakout rooms. Successes. What is working well in your school? What are the challenges and your priorities?
- Fluency
- Breakout rooms. Evaluate what you do for fluency.
- Close – Focus for future meetings
- Evaluation

Subject Resources Update

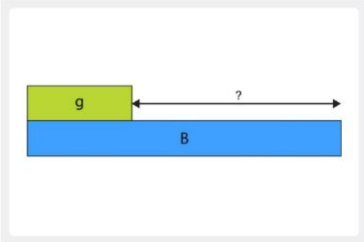
- Primary Subject Knowledge Audit

- The materials are divided into four mathematical areas with up to twelve ‘question documents’ in each area, all drawing heavily on the Primary Mastery professional development materials



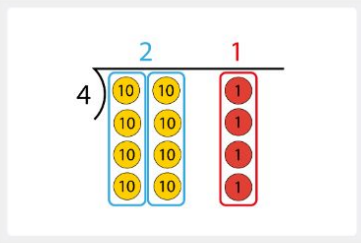
Number

Self-audit questions for a teacher to assess confidence in the teaching of number in KS1 and KS2



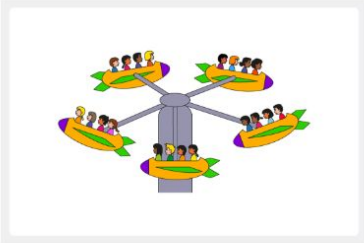
Additive reasoning

Self-audit questions for a teacher to assess confidence in the teaching of additive reasoning in KS1 and KS2



Multiplicative reasoning

Self-audit questions for a teacher to assess confidence in the teaching of multiplicative reasoning in KS1 and KS2



Fractions

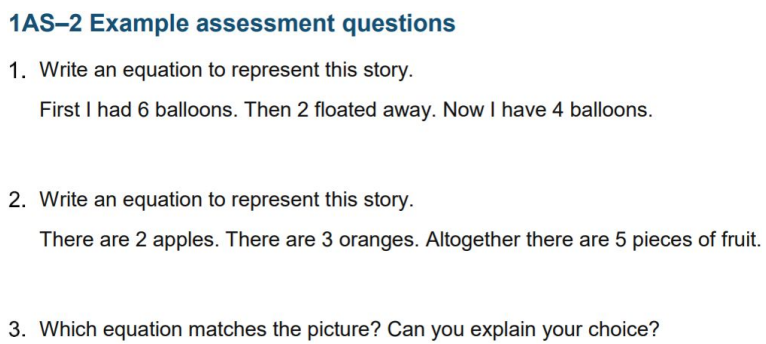
Self-audit questions for a teacher to assess confidence in the teaching of fractions in KS1 and KS2

Each document starts by asking how confident you are in supporting children’s learning in a specific area of maths. Examples are provided to prompt your initial thinking, which you can then refer to while reading detailed notes on how this area might be taught in a primary classroom.

Additional guidance then points to possible pupil errors. You can download and personalise each question document, to support you in meeting the standards in the early career framework (ECF).
The question documents are also available to download as a single zip file within each area
Some questions are supplemented by a series of short videos giving advice on how a topic might be handled in the classroom

Subject Resources update

- NCETM primary-resources, support and teacher CPD for 2022/23
- Curriculum prioritisation in maths
- Primary video lessons 15-20 minutes with follow up tasks
- Primary Assessment materials – Questions, tasks and activities supporting teaching for mastery
- Exemplification of ready to progress criteria Ready to Progress criteria
- Ready to Progress criteria – Assessment questions can be snipped to make worksheets. This can work well with small group intervention.



1AS–2 Example assessment questions

1. Write an equation to represent this story.

   First I had 6 balloons. Then 2 floated away. Now I have 4 balloons.

2. Write an equation to represent this story.

   There are 2 apples. There are 3 oranges. Altogether there are 5 pieces of fruit.

3. Which equation matches the picture? Can you explain your choice?

- Debbie Morgan - no need to differentiate

The need to ensure all children are included in all aspects of a lesson

Further resources

- Early Years Do you have new Early Years teachers?
- This link to the EY section of the NCETM website covers six key areas of early maths learning. Each includes suggested activities, what to look for, common errors and progression charts. And links to the *Numberblocks* resources.

- Developing your use of manipulatives in teaching
- Articles, books and videos to help you use physical representations more effectively in lessons.

Concrete resources explained for parents

- Manipulatives explained for parents

Learning Walk Bingo

All children learning together, all given equal opportunities for depth and consolidation in the lesson							Use of key representations and structures underpinning the development of mathematical understanding for pupils							Use of manipulatives is appropriate and effective in aiding pupil's understanding of mathematical concepts							Good teacher subject knowledge and related pedagogy is evident; including the use of precise mathematical language.						
R	1	2	3	4	5	6	R	1	2	3	4	5	6	R	1	2	3	4	5	6	R	1	2	3	4	5	6
Consistency in terms of lesson design across the school, demonstrating that lessons are constructed with small steps, building on prior learning, culminating in cohesion							Effective questioning is used by teachers to encourage children to think and reason mathematically							Difficulty points/misconceptions being planned for and used to consolidate the key teaching point							Variation - using standard and non-standard examples and variation which draws attention to the structure of the concept i.e. variation not variety						
R	1	2	3	4	5	6	R	1	2	3	4	5	6	R	1	2	3	4	5	6	R	1	2	3	4	5	6
Staff and pupils display a 'growth mindset' culture where all pupils believe they can achieve							There is a healthy and focussed 'buzz', i.e. partner talk focussed on discussing the maths							Pupils are challenged through depth of task, not through acceleration onto new content							Teaching assistants are deployed effectively.						
R	1	2	3	4	5	6	R	1	2	3	4	5	6	R	1	2	3	4	5	6	R	1	2	3	4	5	6

Subject resources

- What is working well for you?

- Interventions
- Lesson design
- Whole school systems
- Pupil outcomes
- Professional learning

Mastery - Underpinning principles

- Mathematical learning behaviours are developed such that pupils focus and engage fully as learners who reason and seek to make representations.
- Teachers continue to develop their specialist knowledge for teaching mathematics, working collaboratively to refine and improve their teaching
- Currriculum design enables a coherent design and detailed sequence of essential content to support sustained progress over time.

Lesson design

- Links to prior learning to ensure all can access new learning.
- Identifies carefully sequenced steps in progression to build understanding.
- Procedural fluency and conceptual understanding are developed in tandem because each supports the development of the other.
- Examples, representations and models are carefully selected to expose the structure of mathematical concepts and emphasise connections, enabling pupils to develop a deep knowledge of mathematics.
- Practice is a vital part of learning, but the practice must be designed to both reinforce pupils' procedural fluency and develop their conceptual

In the classroom

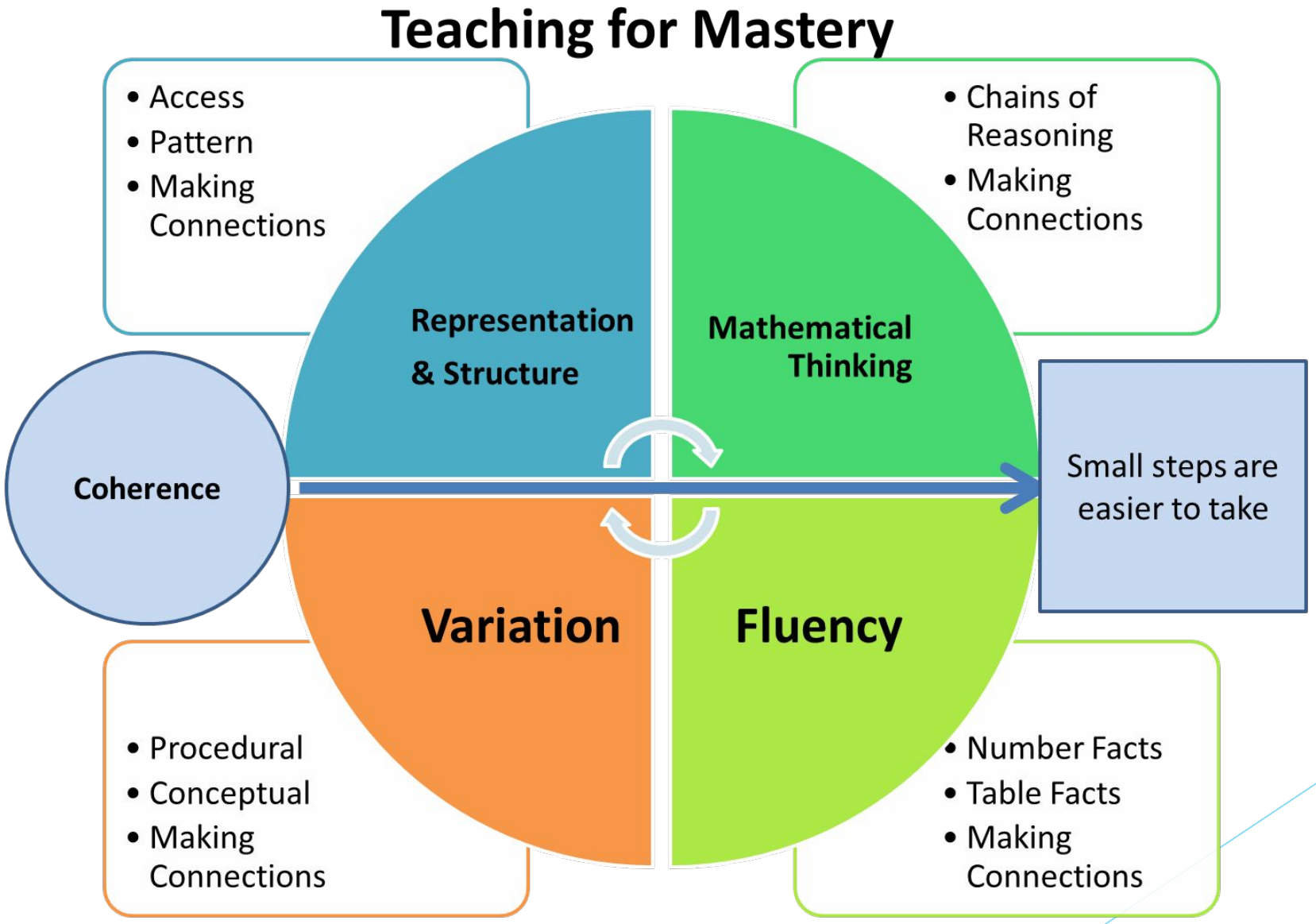
- Pupils are taught through whole- class interactive teaching, enabling all to master the concepts for the next part of the curriculum sequence.
- The teacher leads and back forth interaction, including questioning, short tasks, explanation, demonstration, and discussion enabling pupils to think, reason and apply their knowledge to solve problems.
- Use of precise mathematical language enables all pupils to communicate their reasoning and thinking effectively.
- If a pupil fails to grasp a concept or procedure, this is identified quickly, and gaps in understanding are addressed systematically to prevent them falling behind.
- Significant time is spent developing deep understanding of the key ideas that are needed to underpin future learning
- Key number facts are learnt to automaticity, and other key mathematical facts are learned deeply and practised regularly, to avoid cognitive overload in working memory and enable pupils to focus on new learning.

Consider

The role of:

- Scaffolding
- Repetition
- Challenge
- Mathematical language
- Representation and structure
- Small steps
- The connection between concrete and abstract

The 5 Big Ideas



Inspectors are likely to use the following sources of evidence in making their judgements:

They will generally use:

- interviews with subject lead (if there is one) and/or the appropriate senior leader such as the headteacher
- curriculum plans
- pupils' work
- discussions with pupils
- interviews with teachers
- lesson visits, including conversation with teachers, if possible.

Where appropriate, inspectors may use:

- the school's own records of lesson visits in the subject
- the resources available for teaching mathematics (incl. school library, ICT facilities (access to GIS))
- the school's assessment policy
- assessment instruments, including mark schemes if there are any (not internal data)
- how the school provides pupils with feedback on their work
- how the school promotes the value of the subject, including via enrichment activities
- forms of support for inexperienced, non-specialist or struggling staff
- any support provided for the subject lead
- performance management's role in improving mathematics provision
- details of the timetable and staffing (including details of experience and qualifications of staff)
- school policies on teaching, assessment, homework and behaviour
- documents analysing strengths and weaknesses of the subject and any associated improvement plans.

Reflection – break out rooms

- What is going well? The successes from Autumn Term so far.
- Challenges. What is your focus?

Fluency

What does it mean to be fluent? Think about a language…

We consider someone to be fluent in a technique, procedure, idea, concept or facts at the point at which they no longer need to give it attention"

McCourt, 2019, p43

Fluency

Efficiency – knowing the simplest and quickest route to a problem (efficient methods).

Accuracy – carefully recording knowledge of number facts and other important number relationships, and double checking results.

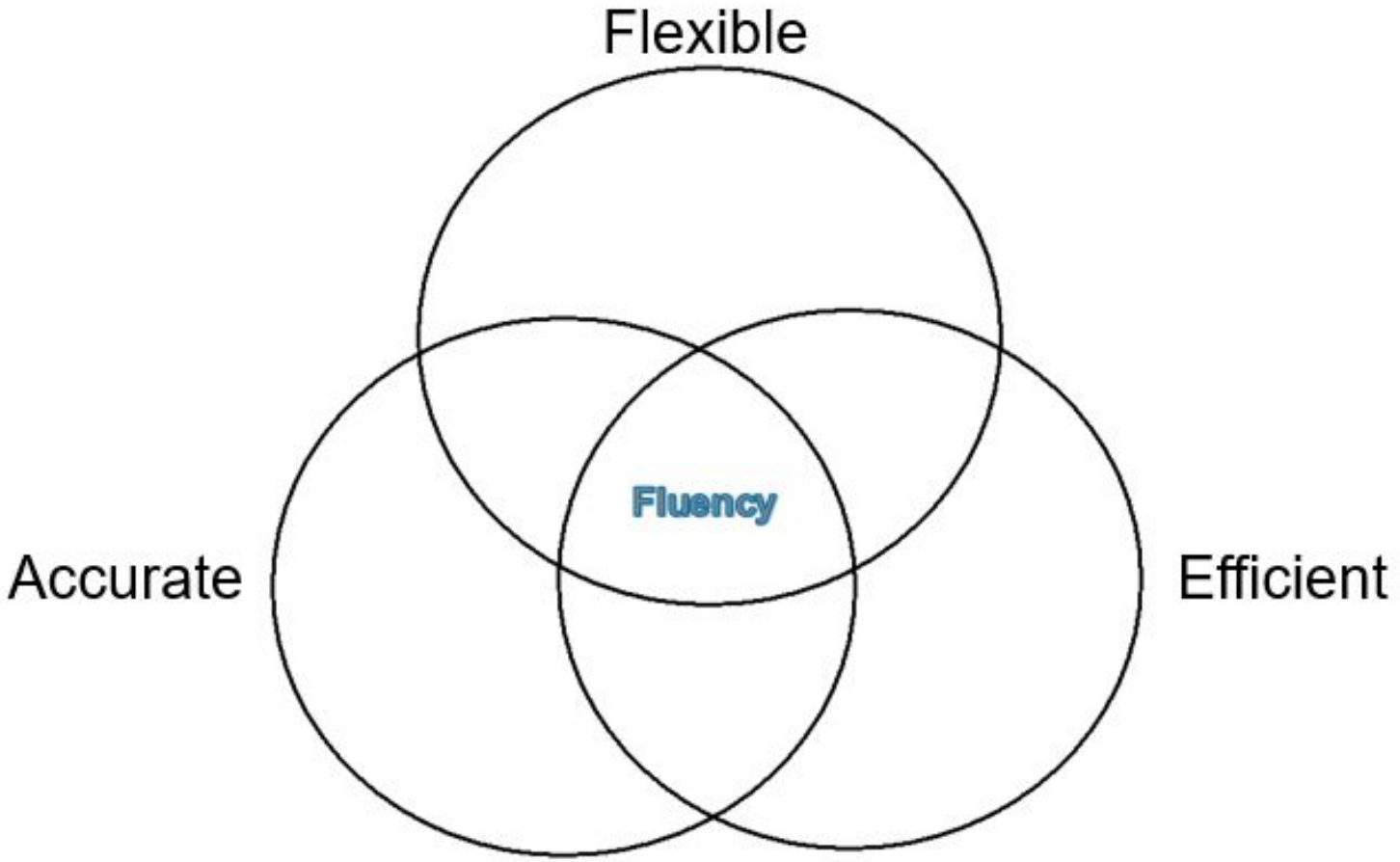
Flexibility – Do children know a range of methods to solve the same problem? Can they check their work in different ways?

So fluency demands more of students than memorising a single procedure – they need to **understand *why* they are doing what they are doing** and **know when it is *appropriate* to use different methods.**

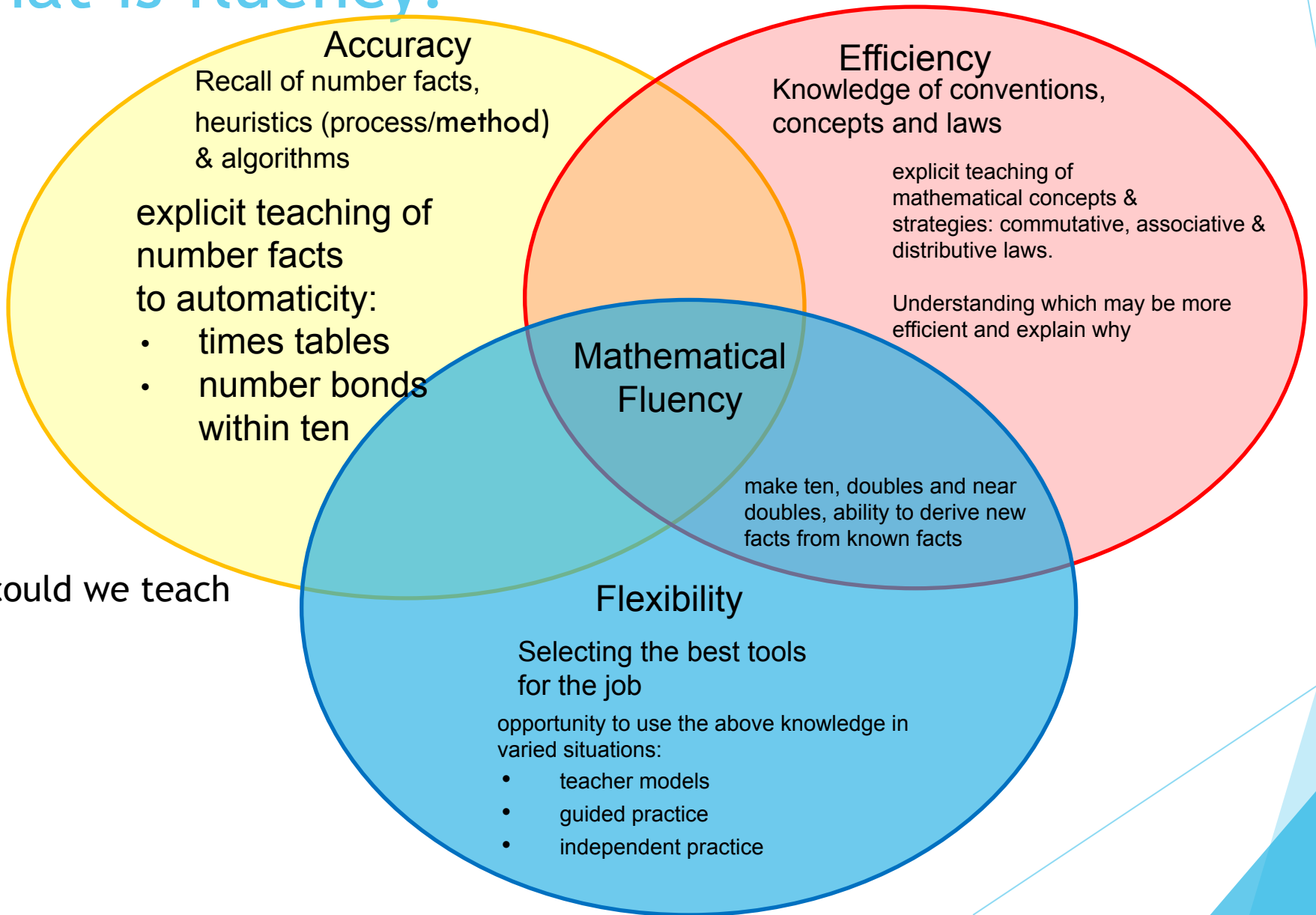
Purpose

- Number Facts Fluency – Free short term memory to support the acquisition of knowledge
- Supports written calculation
- Builds number sense
- Opportunity to rehearse previously taught material (retrieval of previously taught material; interleaving)
- An opportunity to reason and discuss Mathematics
- A balance of recall (building long term memory) and strategies provides effective mental arithmetic

WHERE DO MOST CHILDREN IN YOUR CLASS FIT?

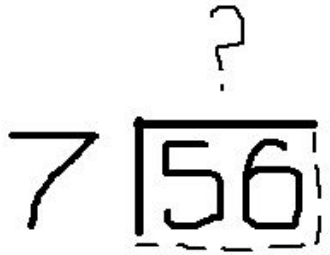


What is fluency?



How could we teach It?

How can we develop fluency in our classrooms?



Fluency:

- Knowledge of number facts
- Fluency in number relationships
- Fluency in being able to apply and make connections

Two strategies:

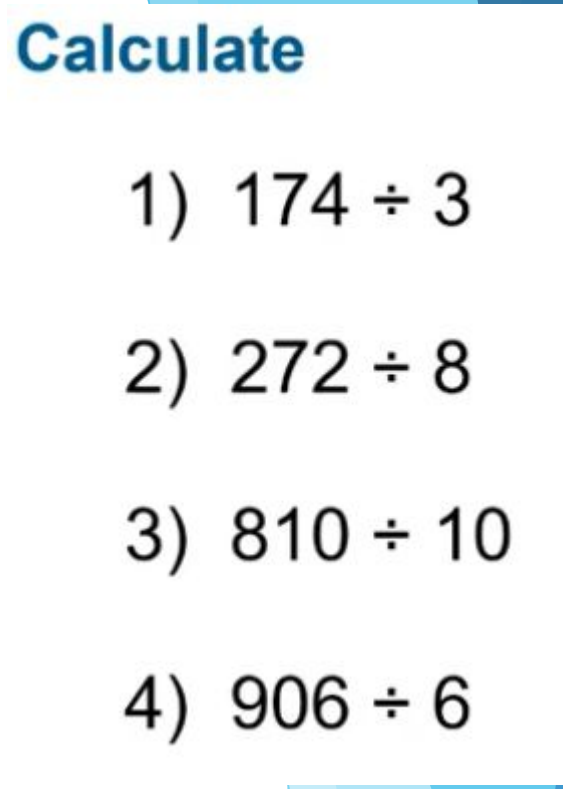
1) Opportunities to select appropriate strategies
2) Comparing strategies using worked examples

So how can we develop fluency within our classrooms?

Two strategies:

1) Opportunities to select appropriate strategies
2) Comparing strategies using worked examples.

So looking at the strategies here- what would the appropriate strategies be here?



What can we do to support children who are struggling?

- Conference them to identify the difficulty.
- Break down the facts into smaller chunks.
- Provide additional practice.
- Provide an additional resource e.g an app

Adding 1 | Bonds to 10 | Adding 10 | Bridging/ compensating

Adding 2 | Adding 0 | Doubles | Near doubles

Y2 facts

+	0	1	2	3	4	5	6	7	8	9	10
0	0 + 0	0 + 1	0 + 2	0 + 3	0 + 4	0 + 5	0 + 6	0 + 7	0 + 8	0 + 9	0 + 10
1	1 + 0	1 + 1	1 + 2	1 + 3	1 + 4	1 + 5	1 + 6	1 + 7	1 + 8	1 + 9	1 + 10
2	2 + 0	2 + 1	2 + 2	2 + 3	2 + 4	2 + 5	2 + 6	2 + 7	2 + 8	2 + 9	2 + 10
3	3 + 0	3 + 1	3 + 2	3 + 3	3 + 4	3 + 5	3 + 6	3 + 7	3 + 8	3 + 9	3 + 10
4	4 + 0	4 + 1	4 + 2	4 + 3	4 + 4	4 + 5	4 + 6	4 + 7	4 + 8	4 + 9	4 + 10
5	5 + 0	5 + 1	5 + 2	5 + 3	5 + 4	5 + 5	5 + 6	5 + 7	5 + 8	5 + 9	5 + 10
6	6 + 0	6 + 1	6 + 2	6 + 3	6 + 4	6 + 5	6 + 6	6 + 7	6 + 8	6 + 9	6 + 10
7	7 + 0	7 + 1	7 + 2	7 + 3	7 + 4	7 + 5	7 + 6	7 + 7	7 + 8	7 + 9	7 + 10
8	8 + 0	8 + 1	8 + 2	8 + 3	8 + 4	8 + 5	8 + 6	8 + 7	8 + 8	8 + 9	8 + 10
9	9 + 0	9 + 1	9 + 2	9 + 3	9 + 4	9 + 5	9 + 6	9 + 7	9 + 8	9 + 9	9 + 10
10	10 + 0	10 + 1	10 + 2	10 + 3	10 + 4	10 + 5	10 + 6	10 + 7	10 + 8	10 + 9	10 + 10

Progression to Fluency addition facts

- This grid shows the addition facts within 10 and strategies to recall or derive them.
- Children should also be fluent in the corresponding subtractions to be ready to progress to Year 2.

Think about…

- Consider your approach to learning additive facts in your school.
- As Maths Lead, how confident are you that the strategies we have explored are explicitly taught? e.g. near doubles
- Are these strategies consistently referred to in KS2?

A suggested progression for teaching additive facts

Group A: Year 1 (Within 10)

1. Adding 1 (e.g. 7 + 1 *and* 1 + 7)
2. Doubles of numbers to 5 (e.g. 4 + 4)
3. Adding 2 (e.g. 4 + 2 *and* 2 + 4)
4. Number bonds to 10 (e.g. 8 + 2 *and* 2 + 8)
5. Adding 10 to a number (e.g. 5 + 10 *and* 10 + 5)
6. Adding 0 to a number (e.g. 3 + 0 *and* 0 + 3)
7. Near doubles (e.g. 3 + 4 *and* 4 + 3)
8. The ones without a family! 5 + 3, 3 + 5, 6 + 3, 3 + 6

Number Sense Maths

Group B: Year 2 (Bridging 10)

9. Doubles of numbers to 10 (e.g. 7 + 7)
10. Near doubles (e.g. 5 + 6 *and* 6 +5)
11. Bridging (e.g. 8 + 4 *and* 4 + 8)
12. Compensating

Changes to practice

- Whole school fluency policies.
- Clear progression mapped through the school.
- A dedicated session each day (10mins).

Connecting 100 multiplication facts (Pattern)

Know your 1s, 2s, 10s and 5s.

Know that these facts are on the other half of the table too

Only learn half the table!

Only 21 facts to know now!

Double 2s to get 4s

Double 4s to get 8s

Learn your 3s

Double 3s to get 6s

9s - one multiple less than 10s

Learn your squares

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

What does it mean to really know your times tables?

7 X 8

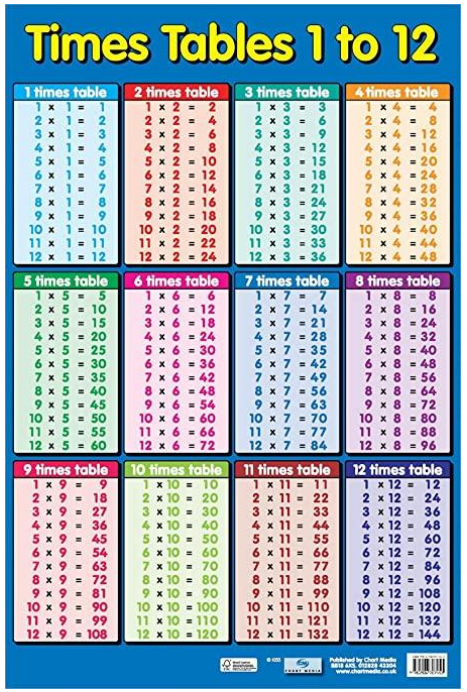
- The mathematician knows, among many other things, that 7 × 8 = 56 is an illustration of the fact that products of odd and even integers are even, that 7 × 8 is the same as 14 × 4 or 28 × 2 or 56 × 1; that only these pairs of positive integers will give 56 as a product; that 7 × 8 is (8 × 8) – 8, or (7 × 7) + 7 and so on. He knows that a rectangle 8 units long and 7 units wide will have an area of 56 square units.

- But the child who has learned to say like a parrot, "Seven times eight is fifty-six" knows nothing of its relation either to the real world or to the world of numbers. He has nothing but blind memory to help him.

  (How Children Fail, page 110, revised edition, page 178)

Multiplication

- No specific timeline
- Only guidance is 12 x 12 by the end of year 4
- What does the progression look like in your school?



One scheme:
Year 2: 2, 5, 10
Year 3: 3, 4, 8
Year 4: 6, 7, 9, 11, 12

NCETM PD materials:
Year 2: 10, 5, doubles and 2
Year 3: 2, 4 and 8, 3, 6 and 9 & 7
Year 4: 11, 12

Importance of committing facts to memory

- Automaticity with number facts frees up the working memory to think about other things such as how to solve a more complex problem (Willingham 2009).
- We need to know the facts so that we can focus on concepts (Willingham 2009).
- We need to know facts so that we can manipulate conceptual relationships.
- Having knowledge of number facts supports pupils to think mathematically as they can use them to reason, see structures and patterns, and make connections (Baroody).

Evaluate what you do in your class for each area:

- Efficiency
- Accuracy
- Flexibility

Fluency research

- Learning multiplication facts with conceptual understanding ATM: Richard Harvey-Swanston discusses learning multiplication facts with fluency.

- Developing number fluency – Nrich: what, why and how.

- What are the issues with learning and assessing Times Tables? –

Cambridge Espresso from Cambridge Mathematics

Evaluation

- https://www.hounsloweducationpartnership.co.uk/survey/primary-subject-network-evaluation-november-2022/

- Thank-you for all your contributions.