Culture – Curriculum – Pedagogy - CPD

Maths Framework

Lingfield Education Trust

All children can enjoy and succeed in maths.

Culture… *we believe that, through an inclusive, high challenge – high support approach to teaching maths, all of our children and staff can enjoy and succeed in maths.*

Curriculum… *what we teach to ensure all of our children are included in enjoying and succeeding in maths.*

Pedagogy… *how we teach to ensure all of our children are included in enjoying and succeeding in maths.*

CPD… *how we ensure all of our staff are competent and confident in their teaching of maths.*

Culture

Culture… *we believe that, through an inclusive, high challenge – high support approach to teaching maths, all of our children and staff can enjoy and succeed in maths.*

All children can enjoy and succeed in maths.

All children can enjoy and succeed in maths.

At Lingfield Education Trust (LET), our maths **culture**, that underpins and informs all that we do, is based around our shared belief that **all** of our children can **succeed** in maths and **enjoy** doing so!

Inclusive by design… Instead of a model in which some children succeed while others try in vain to keep up because concepts are introduced before they are ready to learn them, our curriculum places units of learning at the most accessible point in the learning sequence, giving all children the opportunity to be successful.

Our culture is one of all staff members being the best prepared possible to ensure all children can master all of maths. At LET, mastery means every staff member moving together to improve their maths – not just children.

This culture informs the **intent** of our maths **curriculum**: all children to be factually fluent, procedurally fluent and flexibly fluent so that they can reason to solve problems. We know this intent will give them the best possible chance to master maths at secondary school and have confidence in the workplace and everyday life situations.

Our curriculum is designed so that **all** children learn content in the right order and for a sufficient amount of time through the right amount of practice. Learning steps and units of learning last as long as they need for **all** children to have grasped a concept/area of maths – a proper mastery approach.

To **implement** our curriculum, we base our **pedagogy** around a consistent lesson delivery model (LDM) that fuses together the best of cognitive science approaches and the mastery approach to maths. Our robust LDM has several benefits:

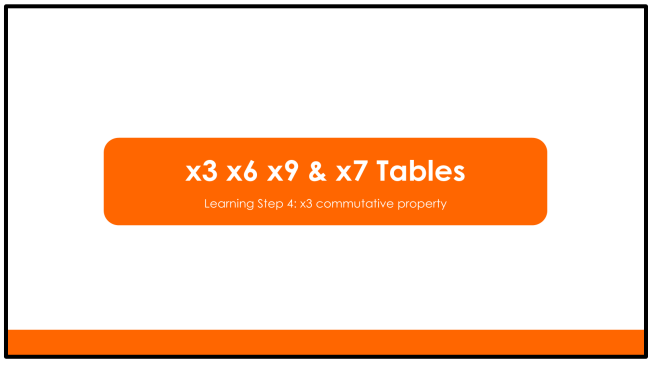
- It acts as daily CPD for our staff about the most effective way to help children learn mathematical content.
- Allows predictability and consistency for children.
- Acts as a daily induction model for new staff.

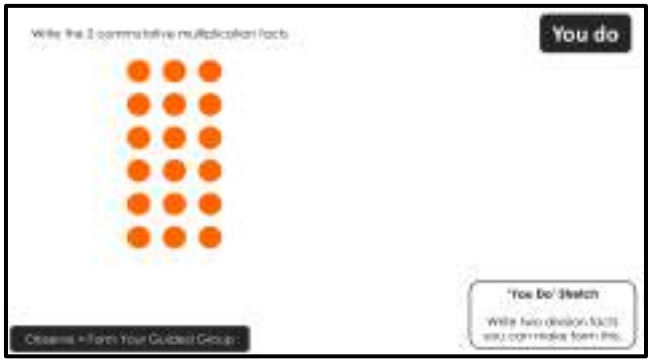
To ensure that our curriculum has the desired **impact**, we have a robust assessment, monitoring and **CPD** model that encompasses both pre-unit/post-unit assessments, summative assessments, fluency checks along with ongoing checks for understanding in lessons.
Running alongside this same day intervention is at the heart of our curriculum to ensure **all** children are ready for their new learning.

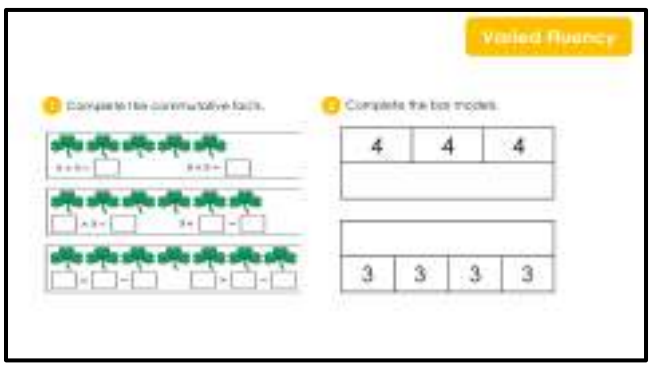
High-Quality Central Resources

High-quality, expert-made lesson resources are provided for staff. Providing resources does not replace teacher expertise; it creates the conditions for teachers to deploy their expertise where it has the greatest impact. There are many reasons resources are provided:

- To ensure all children receive the same high-quality science of learning & mastery-based learning opportunities.
- To tackle workload issues and thus allow our teachers to be as fresh as possible to deliver high-quality learning opportunities.
- To allow our staff to reallocate their preparation time to **rehearsal**, **readiness** (adapting resources & producing 'plan B' including for focus groups) and **reading and research** around the teaching of maths from our maths reading library.
- To embed consistent, codified learning routines throughout school as we know this has a positive impact on both academic and behavioural outcomes.
- To allow for smooth transitions within lessons, between lessons, between year groups and between staff (for example supply or TA cover).







Curriculum

Curriculum… *what we teach to ensure all of our children are included in enjoying and succeeding in maths.*

All children can enjoy and succeed in maths.

Maths Curriculum

Our curriculum is one aimed at ensuring our shared belief, that ***all of our children can enjoy and succeed in maths***, becomes a reality.

We believe strongly that all children can learn their intended curriculum if it is sequenced correctly and affords children enough time to learn the mathematical content. For that reason, we have based our curriculum around the following materials:

- NCETM Curriculum Prioritisation Materials
- NCETM Professional Development Materials
- NCETM Mastering Number
- NCETM Checkpoints
- DfE Teaching Children to Calculate Mentally

Where possible, statistics and measures are taught and practised in other units of work to give them a meaningful context and purpose. Skills learned in these areas are then built into our systematic spaced retrieval sessions.

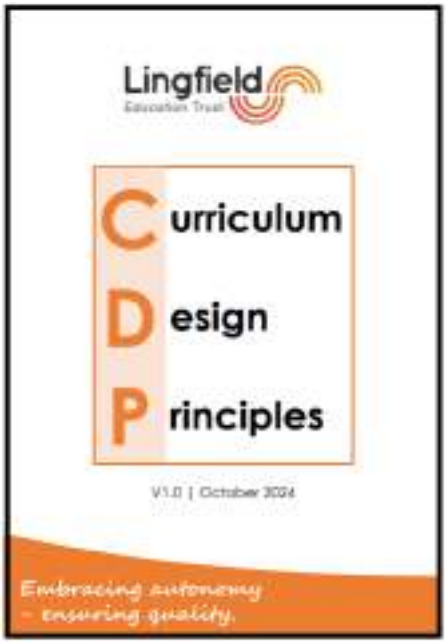
To ensure all children can access mathematical content, we apply the science of cognitive load theory to our curriculum so that children have the prerequisite knowledge for a unit. For example, formal written multiplication is only taught when multiplication table facts have been secured; column addition is only taught when addition/subtraction table facts have been secured.

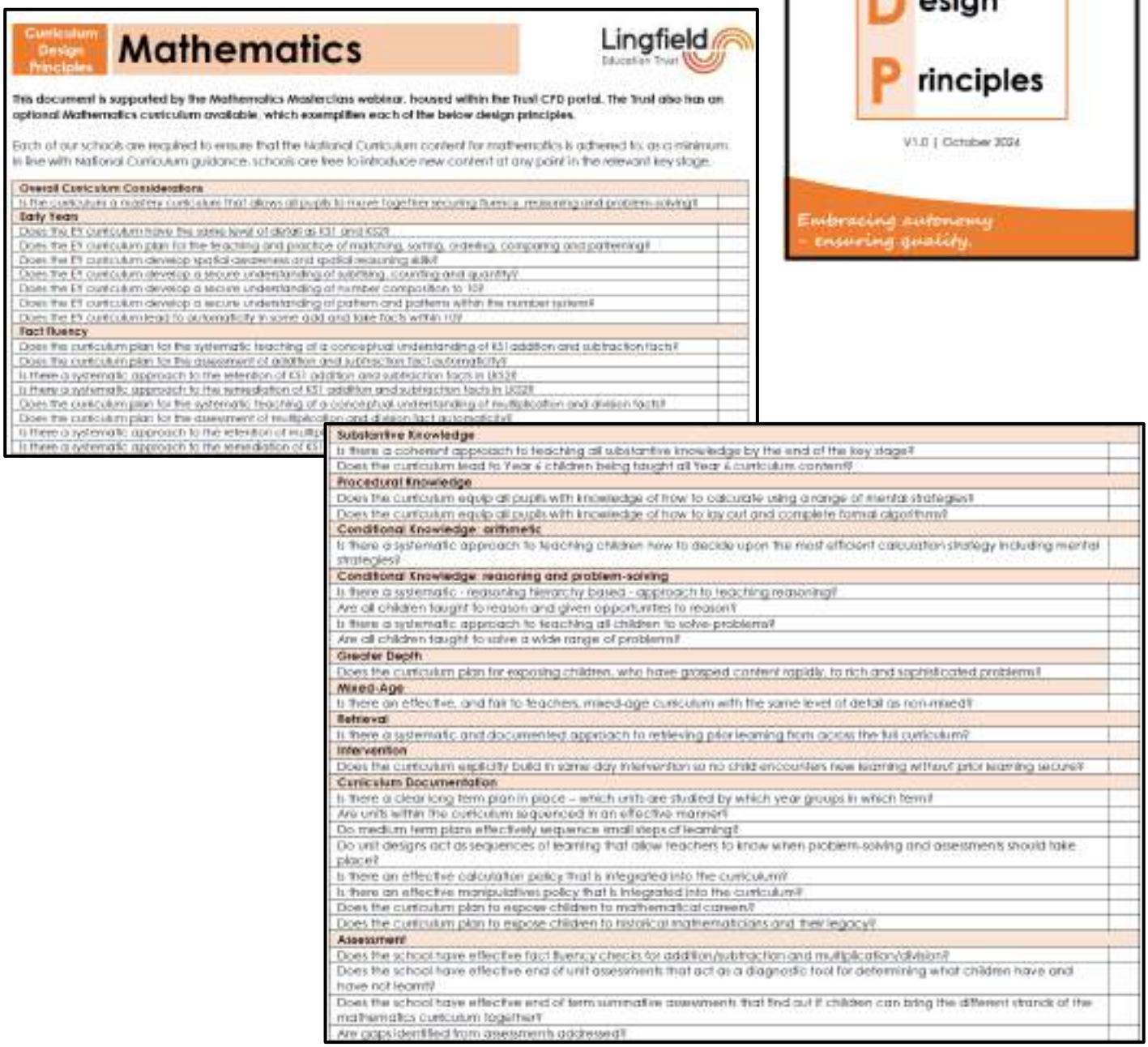
Our EYFS curriculum planning has the same depth and detail as the rest of school, as we recognise how essential the best possible start is. EYFS maths has its own section in this document.

Learning sequences identify linked mental maths/fact fluency starters; where a dedicated practical lesson is required; where a problem-solving lesson fits; when assessment/pause/stretch should take place; and when a practice lesson is required to allow children to simply consolidate what they have learnt.

Curriculum Design Principles

To ensure all our children have the best possible maths education, our maths curriculum meets all the standards of LET Curriculum Design Principles.





Curriculum Design Principles

Mathematics

Lingfield Education Trust

This document is supported by the Mathematics Masterclass webinar, housed within the Trust CPD portal. The Trust also has an optional Mathematics curriculum available, which exemplifies each of the below design principles.

Each of our schools are required to ensure that the National Curriculum content for mathematics is adhered to, as a minimum, in line with National Curriculum guidance. schools are free to introduce new content at any point in the relevant key stage.

Overall Curriculum Considerations	
Is the curriculum a mastery curriculum that allows all pupils to master together securing fluency, reasoning and problem-solving?	
Early Years	
Does the EY curriculum have the same level of detail as KS1 and KS2?	
Does the EY curriculum plan for the teaching and practice of matching, sorting, ordering, comparing and patterning?	
Does the EY curriculum develop spatial awareness and spatial reasoning skills?	
Does the EY curriculum develop a secure understanding of subitising, counting and quantity?	
Does the EY curriculum develop a secure understanding of number composition to 10?	
Does the EY curriculum develop a secure understanding of pattern and patterns within the number system?	
Does the EY curriculum lead to automaticity in some add and take facts within 10?	
Fact fluency	
Does the curriculum plan for the systematic teaching of a conceptual understanding of KS1 addition and subtraction facts?	
Does the curriculum plan for the assessment of addition and subtraction fact automaticity?	
Is there a systematic approach to the retention of KS1 addition and subtraction facts in LKS2?	
Is there a systematic approach to the remediation of KS1 addition and subtraction facts in LKS2?	
Does the curriculum plan for the systematic teaching of a conceptual understanding of multiplication and division facts?	
Does the curriculum plan for the assessment of multiplication and division fact automaticity?	
Is there a systematic approach to the retention of multi	
Is there a systematic approach to the remediation of KS	

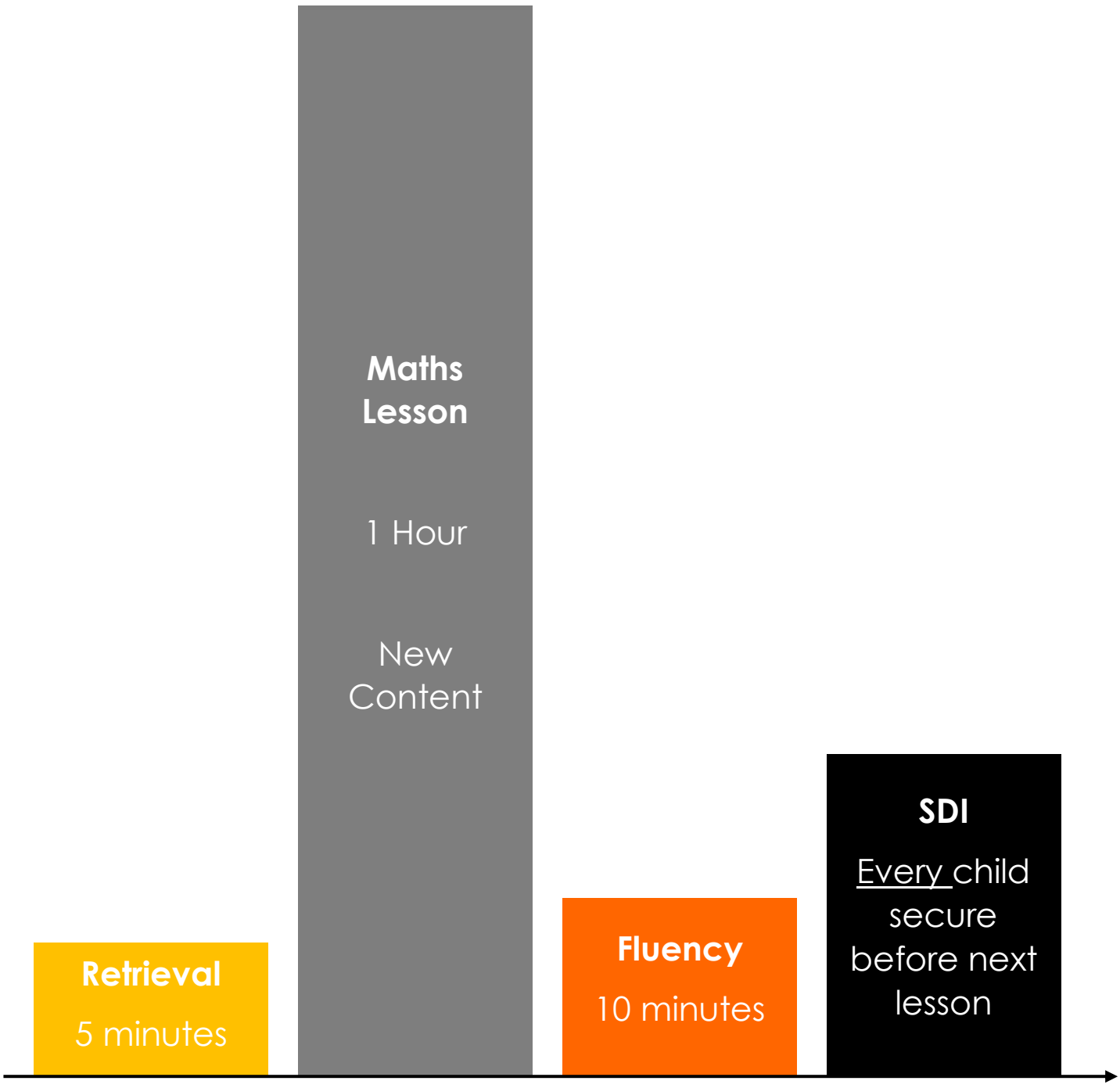
Substantive Knowledge	
Is there a coherent approach to teaching all substantive knowledge by the end of the key stage?	
Does the curriculum lead to Year 6 children being taught all Year 6 curriculum content?	
Procedural Knowledge	
Does the curriculum equip all pupils with knowledge of how to calculate using a range of mental strategies?	
Does the curriculum equip all pupils with knowledge of how to lay out and complete formal algorithms?	
Conditional Knowledge: arithmetic	
Is there a systematic approach to teaching children how to decide upon the most efficient calculation strategy including mental strategies?	
Conditional Knowledge: reasoning and problem-solving	
Is there a systematic - reasoning hierarchy based - approach to teaching reasoning?	
Are all children taught to reason and given opportunities to reason?	
Is there a systematic approach to teaching all children to solve problems?	
Are all children taught to solve a wide range of problems?	
Greater Depth	
Does the curriculum plan for exposing children, who have grasped content rapidly, to rich and sophisticated problems?	
Mixed-Age	
Is there an effective, and fair to teachers, mixed-age curriculum with the same level of detail as non-mixed?	
Retrieval	
Is there a systematic and documented approach to retrieving prior learning from across the full curriculum?	
Intervention	
Does the curriculum explicitly build in same day intervention so no child encounters new learning without prior learning secure?	
Curriculum Documentation	
Is there a clear long term plan in place – which units are studied by which year groups in which term?	
Are units within the curriculum sequenced in an effective manner?	
Do medium term plans effectively sequence small steps of learning?	
Do unit designs act as sequences of learning that allow teachers to know when problem-solving and assessments should take place?	
Is there an effective calculation policy that is integrated into the curriculum?	
Is there an effective manipulatives policy that is integrated into the curriculum?	
Does the curriculum plan to expose children to mathematical careers?	
Does the curriculum plan to expose children to historical mathematicians and their legacy?	
Assessment	
Does the school have effective fact fluency checks for addition/subtraction and multiplication/division?	
Does the school have effective end of unit assessments that act as a diagnostic tool for determining what children have and have not learnt?	
Does the school have effective end of term summative assessments that find out if children can bring the different strands of the mathematics curriculum together?	
Are gaps identified from assessments addressed?	

Daily Maths Timetable

This curriculum aims to deliver mathematical excellence for all children.

For this happen the following daily mathematical diet is followed.

These sessions are split to address cognitive load issues and to ensure each phase of the daily maths diet gets its designated time allowance.



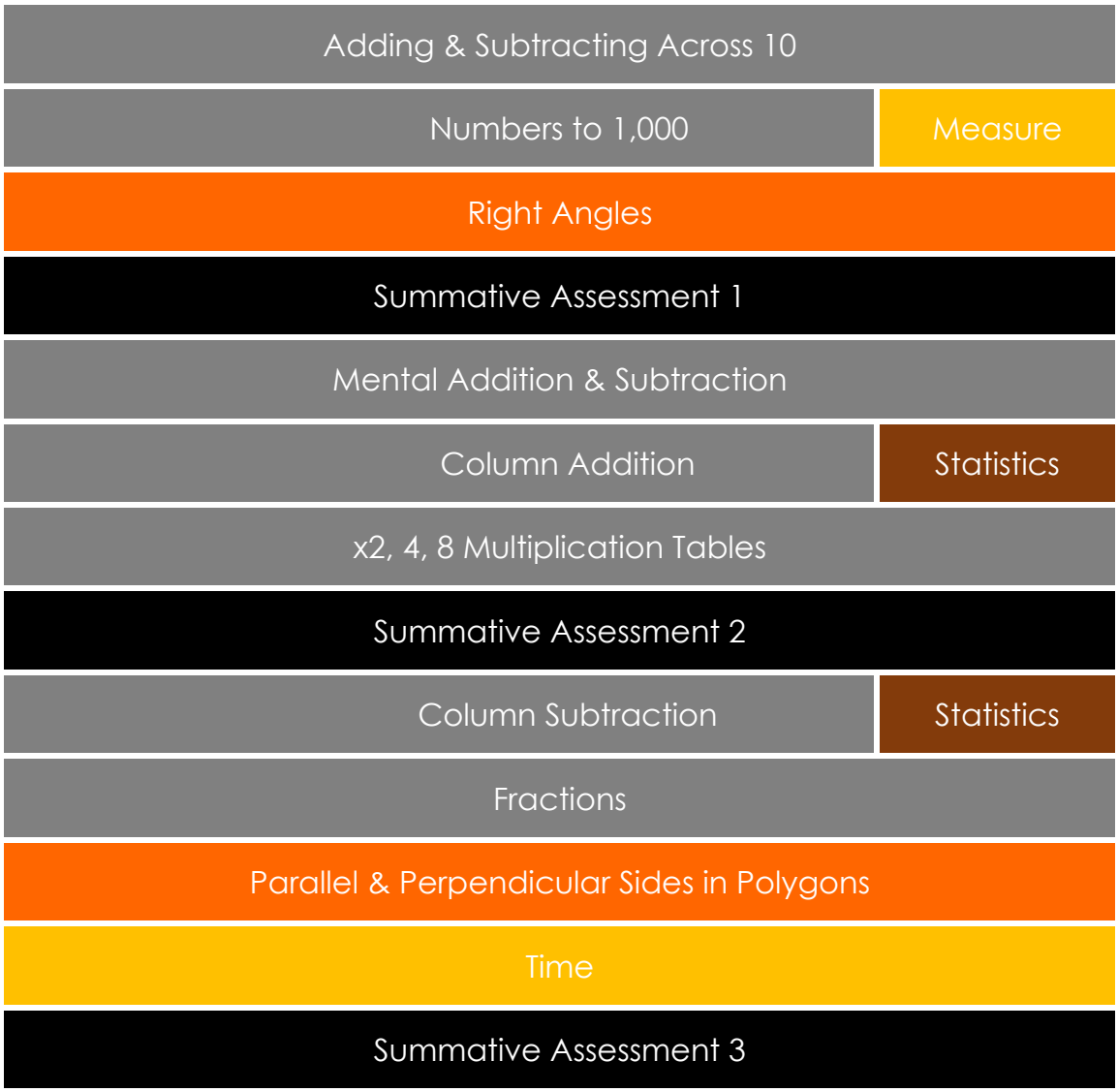
Curriculum Sequences

Our curriculum is based on in-depth 'mastery blocks' of learning so that all children can learn deeply using the 'big five ideas' of teaching for mastery.

Curriculum sequences do not specify an amount of time per unit as teachers are encouraged to take the time that is needed to secure durable learning for all.

Measures and statistics are taught and practised within other units of work to ensure they are learnt in context.

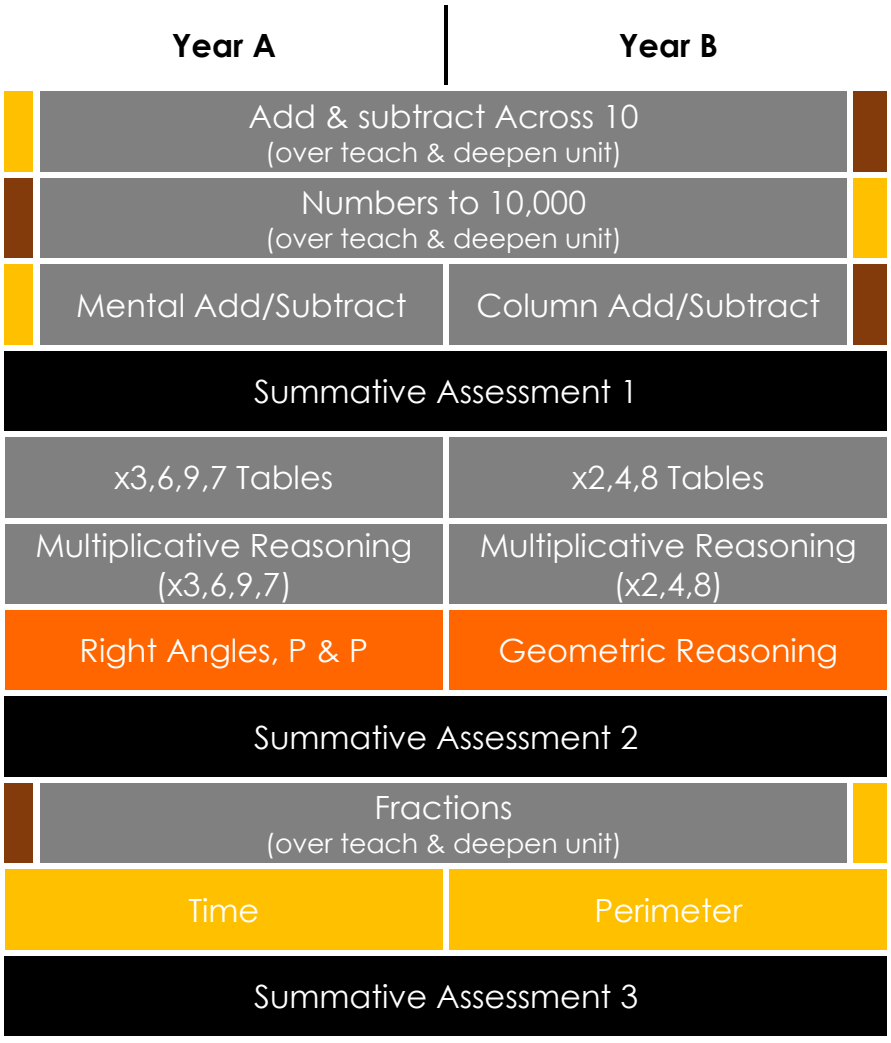
Summative Assessments are planned as one-week unit of work to ensure teachers have time set aside for them and so that there is time to unpick the papers. These summative assessments are tailor-made to match our curriculum and are delivered when the unit is reached thus allowing more children to be successful as they are tested on what has been taught.



Mixed-Age Curriculum

Our approach to mixed-age planning:

- Only one input which moves from the lower year group content to the higher – for all.
- Year A and Year B cycle to allow for longer units to cover key skills from both year groups – where necessary.
- Anchor units of place value, addition & subtraction, multiplication & division and fractions are in both Year A and Year B.
- Other units are spaced over Year A and Year B with only one input which moves from the lower year group content to the higher – for all.
- In the second cycle, children who showed greater depth in the first cycle for anchor units, will complete a pre-assessment to identify if this level of understanding has been maintained.
- If it has, they will bypass teacher input and basic fluency (our everyone on the bus task), and instead independently – or in a collaborative group – work on varied fluency and rich, sophisticated reasoning tasks.
- If the pre-assessment reveals they have not maintained the earlier level of understanding, they will join the main teaching to reinforce their earlier learning.



GDS Pre-Assessments

- GDS pre-assessments are used to find out which children - in the second visit of a topic - have retained their understanding. Those who have progress more quickly to deepening and GDS tasks.

Y3-4 GDS Pre-Assessment
Adding & Subtracting Across 10

Learning Step(s)

2 3

Which order is the most effective to add these 3 addends?

4 + 8 + 6	7 + 5 + 3
4 + 8 + 6	7 + 5 + 3
8 + 6 + 4	7 + 3 + 5
4 + 6 + 8	5 + 3 + 7

4 5

Re-write each equation as 'make 10 and then'

7 + 5 = 13

8 + 6 = 14

6 7

Re-write each equation as 'split the subtrahend to get back to 10 and then'

14 – 8 = 6

16 – 9 = 7

8 9

Re-write each equation as 'split the minuend'

12 – 7 = 5

17 – 8 = 9

Retrieval Curriculum

Retrieval without a curriculum is an activity.

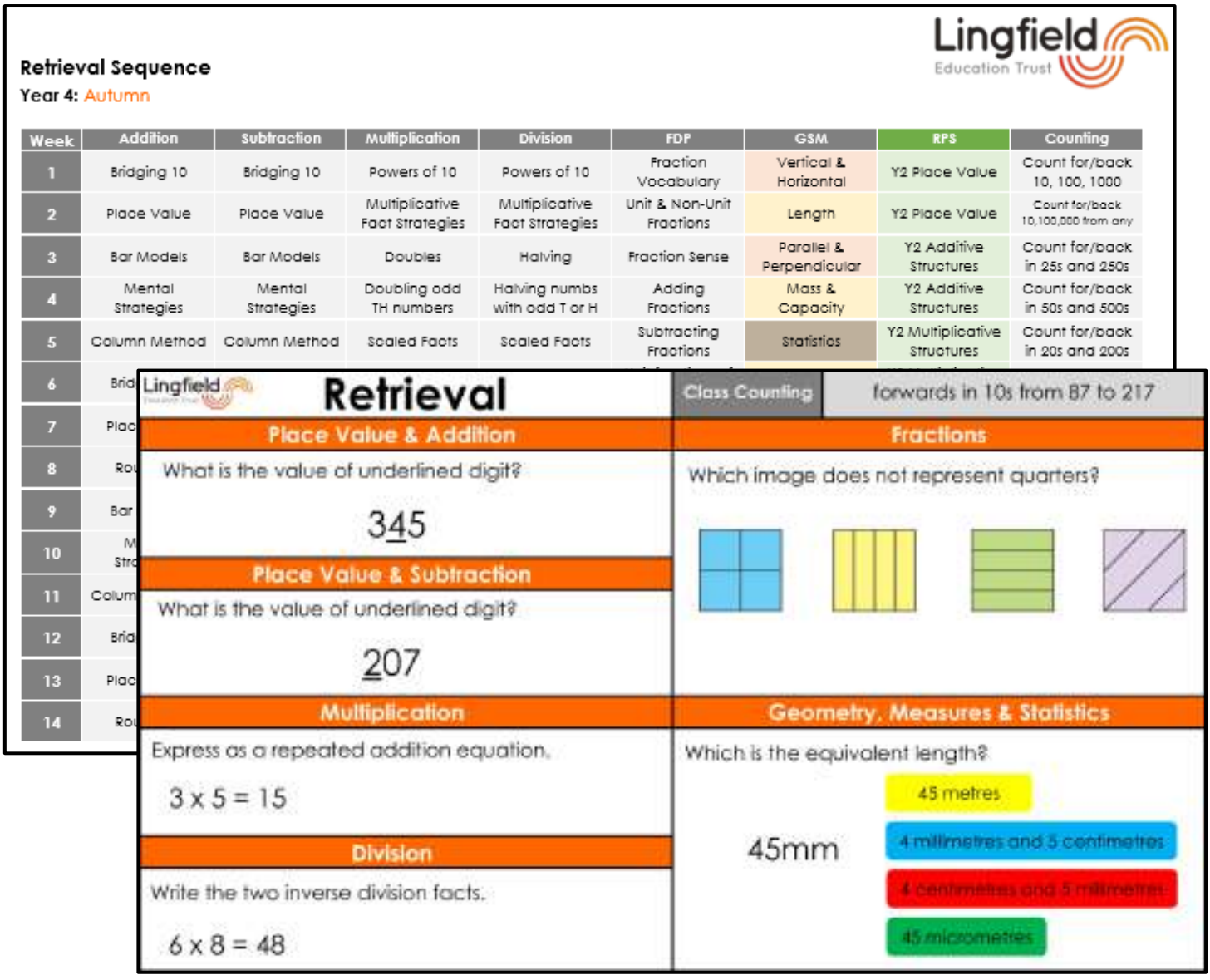
To ensure the content learnt in maths lessons is retained, all learning is built into our systematic, spaced retrieval plans.

This ensures that all key knowledge is regularly retrieved and that nothing is left out. This also means maths lessons can focus on that year group's new content.

Reasoning and problem-solving are built into retrieval sessions so children are regularly working on problems out of sync with the unit they are learnt in.

Each retrieval session starts with 'class counting' which is itself drawn from a systematic plan.

These sessions are delivered daily.



Retrieval Sequence

Year 4: Autumn

Week	Addition	Subtraction	Multiplication	Division	FDP	GSM	RPS	Counting
1	Bridging 10	Bridging 10	Powers of 10	Powers of 10	Fraction Vocabulary	Vertical & Horizontal	Y2 Place Value	Count for/back 10, 100, 1000
2	Place Value	Place Value	Multiplicative Fact Strategies	Multiplicative Fact Strategies	Unit & Non-Unit Fractions	Length	Y2 Place Value	Count for/back 10,100,000 from any
3	Bar Models	Bar Models	Doubles	Halving	Fraction Sense	Parallel & Perpendicular	Y2 Additive Structures	Count for/back in 25s and 250s
4	Mental Strategies	Mental Strategies	Doubling odd TH numbers	Halving numbs with odd T or H	Adding Fractions	Mass & Capacity	Y2 Additive Structures	Count for/back in 50s and 500s
5	Column Method	Column Method	Scaled Facts	Scaled Facts	Subtracting Fractions	Statistics	Y2 Multiplicative Structures	Count for/back in 20s and 200s
6	Brid							
7	Plac							
8	Rou							
9	Bar							
10	M Stra							
11	Colum							
12	Brid							
13	Plac							
14	Rou							

Retrieval

Class Counting: forwards in 10s from 87 to 217

Place Value & Addition

What is the value of underlined digit?

345

Place Value & Subtraction

What is the value of underlined digit?

207

Multiplication

Express as a repeated addition equation.

3 x 5 = 15

Division

Write the two inverse division facts.

6 x 8 = 48

Fractions

Which image does not represent quarters?

Geometry, Measures & Statistics

Which is the equivalent length?

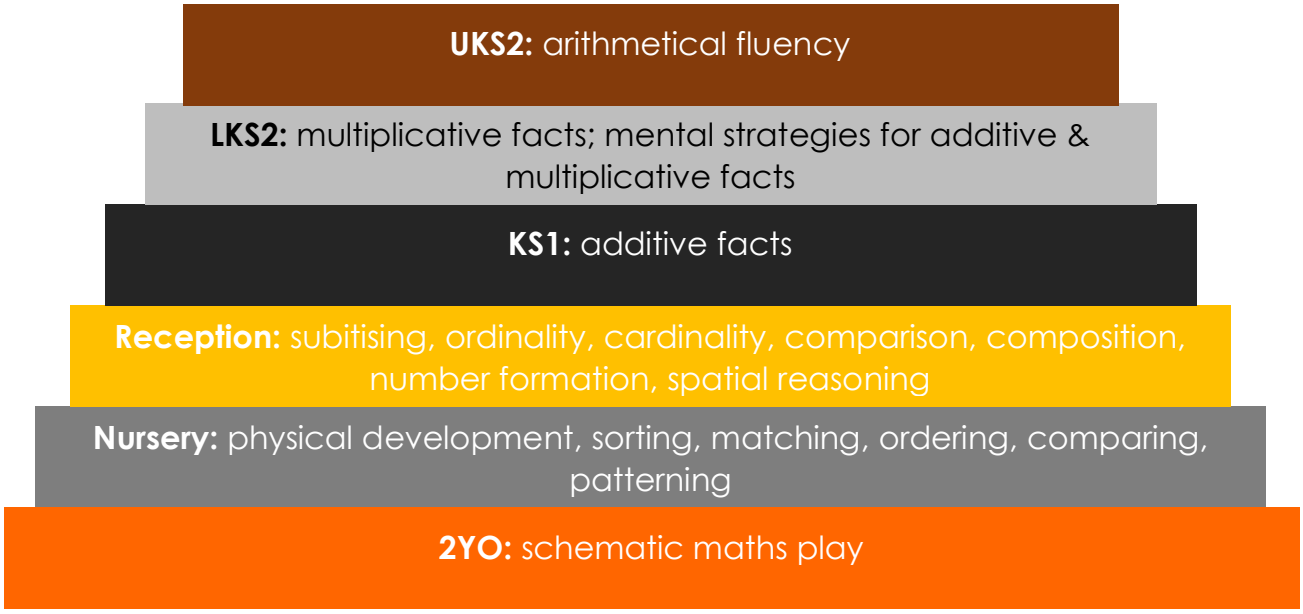
45mm

- 45 metres
- 4 millimetres and 5 centimetres
- 4 centimetres and 5 millimetres
- 45 micrometres

Foundational Maths & Fact Fluency… Curriculum

Each phase of our maths curriculum has a strong focus on developing firm foundations for future mathematics. Each phase continues to build on the foundations from the previous phase in addition to their own new foci.

Foundational maths is developed through our three-part curriculum: main curriculum, retrieval and fact fluency. Key shape and measure foundational knowledge is developed within the main curriculum where children will learn it most effectively.



Foundational Maths & Fact Fluency… Teaching

Fact fluency – what we call fingertip knowledge or maths currency – is what makes maths accessible for all. We know that without this children cannot access and enjoy the wider maths curriculum.

To ensure fact fluency is not a barrier for any child, we have dedicated daily fact fluency sessions that ensure children gain a deep conceptual understanding of these facts, which leads to automaticity. These sessions are daily and last for 15 minutes in each year group.

Reception	Year 1	Year 2	Year 3	Year 4	Year 5
NCETM YR Mastering Number	NCETM Y1 Mastering Number	NCETM Y2 Mastering Number	NCETM Y3 Mastering Number until Christmas LET Multiplication Tables after Christmas	LET Multiplication Tables or NCETM Y4 Mastering Number	LET Y5 Fact Fluency or NCETM Y5 Mastering Number

KS1 focus on securing additive facts; LKS2 focus on embedding additive facts before developing multiplicative facts; UKS2 focus on applying these facts to wider mental strategies, thus regularly retrieving the basic facts to working memory.

Foundational Maths & Fact Fluency… Assessment

To ensure the conceptual teaching of fact fluency leads to automaticity, children complete half-termly fact fluency checks.

From this gaps are identified and intervention put in place.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y1	Early Number	Addition facts to/within 5	Addition facts to/within 10	Addition facts to/within 10	Additive facts to/within 10	Additive facts to/within 10
Y2	Addition facts from 10 to 20	Addition facts from 10 to 20	Additive facts from 10 to 20	Additive facts from 10 to 20	Addition bridging 10 facts	Addition bridging 10 facts
Y3	Additive bridging 10 facts	Additive bridging 10 facts	x2, x10, x5 multiplication facts	x2, x10, x5 multiplication facts	x4, x8 multiplication facts	x4, x8 multiplication facts
Y4	x3, x6 multiplication facts	x3, x6 multiplication facts	x7,x9 multiplication facts	x7,x9 multiplication facts	Multiplication facts to 12 x 12	Multiplication facts to 12 x 12
Y5	Multiplication facts to 12 x 12	Multiplication facts to 12 x 12	Additive & multiplicative facts	Additive & multiplicative facts	Additive & multiplicative facts	Additive & multiplicative facts

Learning Sequences

Each unit of new learning begins with a **prior learning check** to ensure children have the pre-requisite knowledge required to have a chance of securing this new learning. Those who do not receive immediate remediation to fix key gaps. Children with no gaps in pre-requisite learning complete a range of greater depth deepening tasks to allow the other children to catch back up.

Regular **problem-solving lessons** allow all children to be taught, practise and apply a wide range of domain specific problem-solving strategies.

Each unit concludes with an **end of block assessment**. Following this those who had gaps in their learning complete **pause** lessons to fix these gaps while those with no gaps complete greater depth deepening activities in **stretch** lessons.

Additional problem-solving skills lessons – drawn from Nrich – are completed each half-term to ensure children solve non-routine problems.

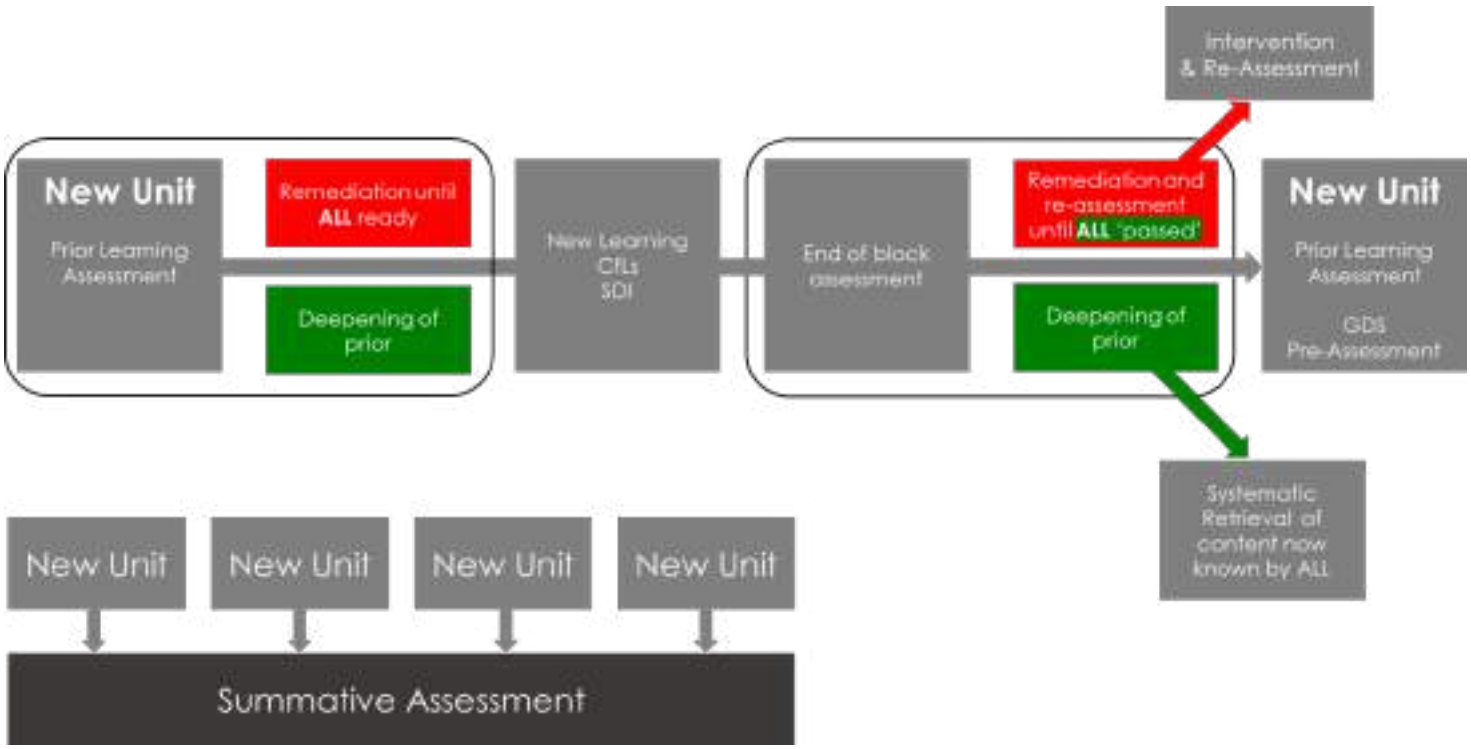
Y3 Learning Sequence

Numbers to 1,000

Learning Steps
Prior learning check & remediation/deepening of prior
Composition of 100
Represent numbers to 1,000
Partition numbers to 1,000
Value of digits to 1,000
Number line to 1,000
1 more, 10 more, 100 more
1 less, 10 less, 100 less
PS Lesson: place value to 1,000 (more than one possibility)
Compare numbers to 1,000
Order numbers to 1,000
PS Lesson: compare & order (working backwards)
Measure length and height from zero using whole metres and cm
Measure length and height from zero using mm and cm
Equivalent lengths
Compare lengths
PS Lesson: length (real-life word)
Count forwards and backwards in multiples of 2, 20, 5, 50 and 25
Measure mass from zero up to 1kg using grams
Measure mass from zero above 1kg using whole kg and grams
Measure volume from zero up to 1 litre using ml
Measure volume from zero above 1 litre using whole litres and ml
PS Lesson: mass & capacity (real-life word)
Assessment
Pause & Stretch: re-assessment & deepening as required
PS Skills Lesson: trial & improvement

Teaching – Assessment Cycle

Assessment is simply a different type of lesson and as such there are multiple layers of assessment and **remediation** in our maths model.



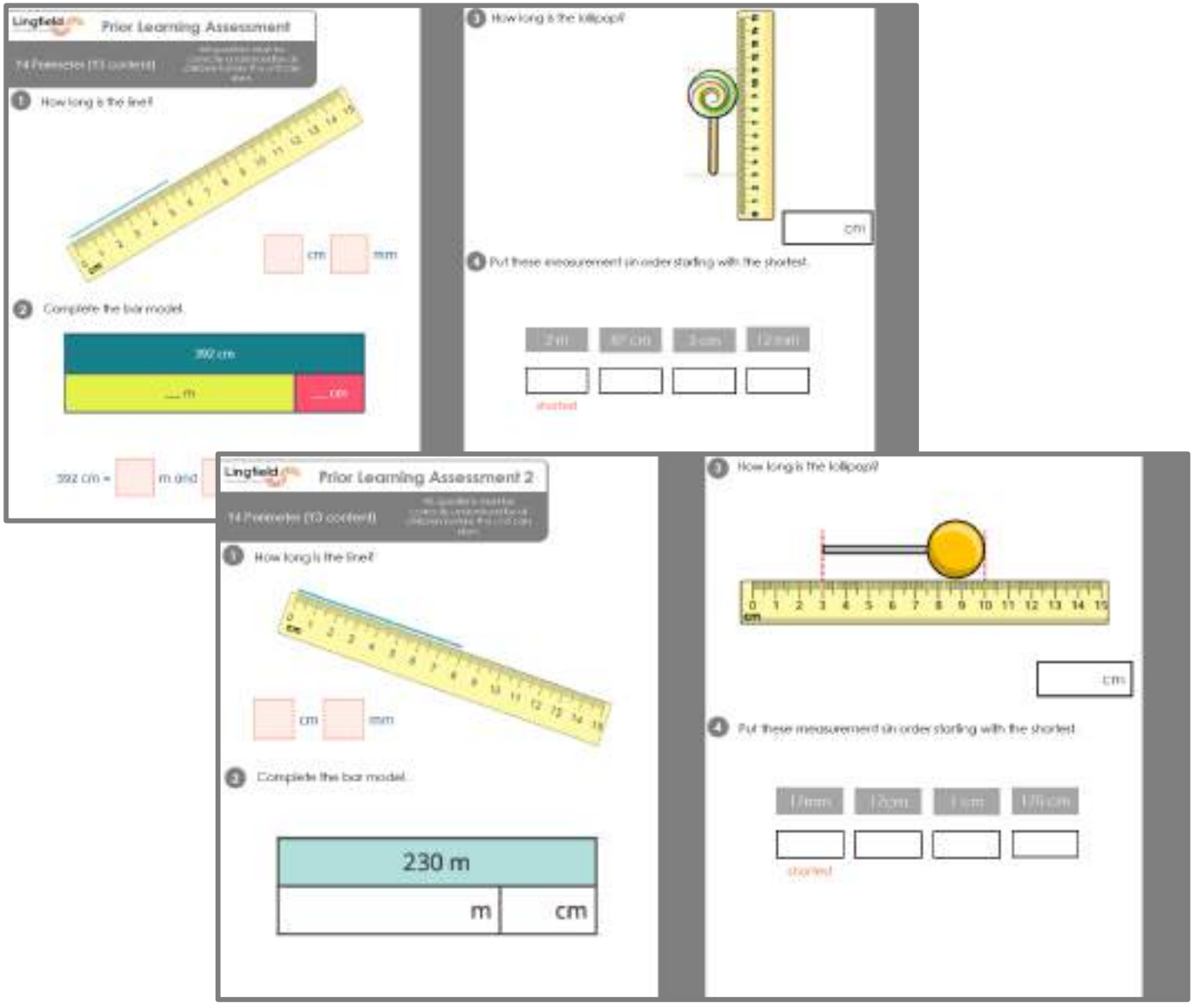
Prior Learning Check	1-2-1 or group intervention until ready to start the new unit.
Within Lesson	Guided Group Blocked v Interleaved
End of Lesson (marking)	Same Day Intervention
End of Block Assessments	Pause & Stretch Re-Assessment
Summative Assessments	Intervention Curriculum Review
Retrieval	Same Day Intervention

Prior Learning Checks

Allow teachers to identify if children have the pre-requisite knowledge from the prior year group's learning to tackle the new content.

Before starting the new unit, intervention is carried out so all children are ready to move on.

Those with no gaps complete deepening activities, while other children complete remediation.

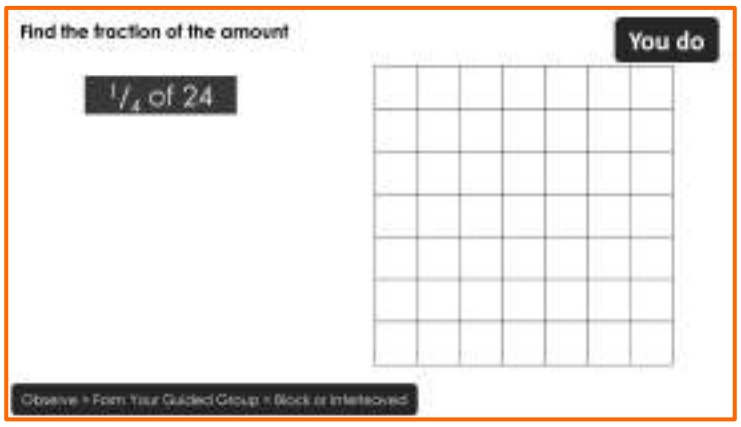


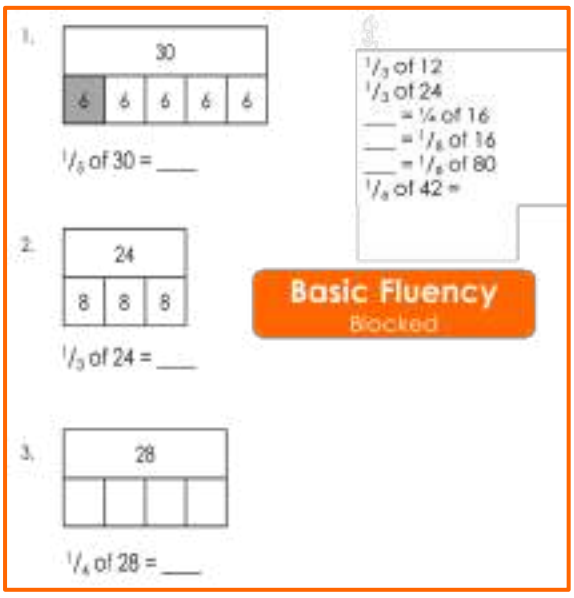
Responsive Within Lesson Assessment

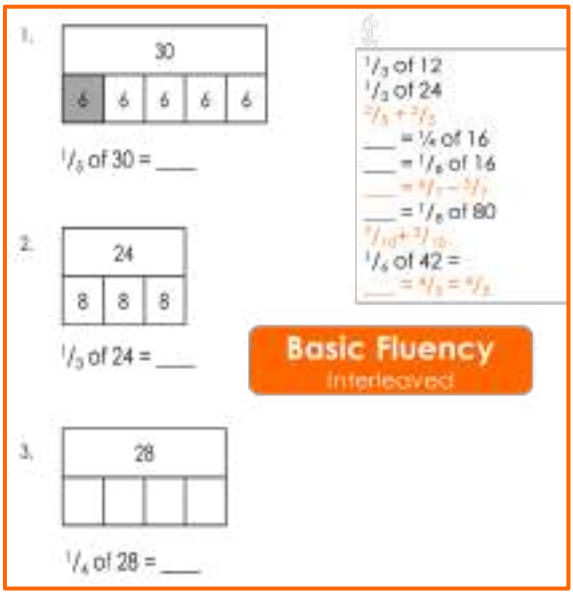
After the teaching and modelling process, a 'you do' check for understanding question - completed independently and matching the full difficulty of the first task – is used to signpost which children will work on the interleaved task, and which will work on the blocked task (with support where required).

It also signposts which children will form the focus group (if any).

This ensures more confident mathematicians are stretched even more in their basic fluency.

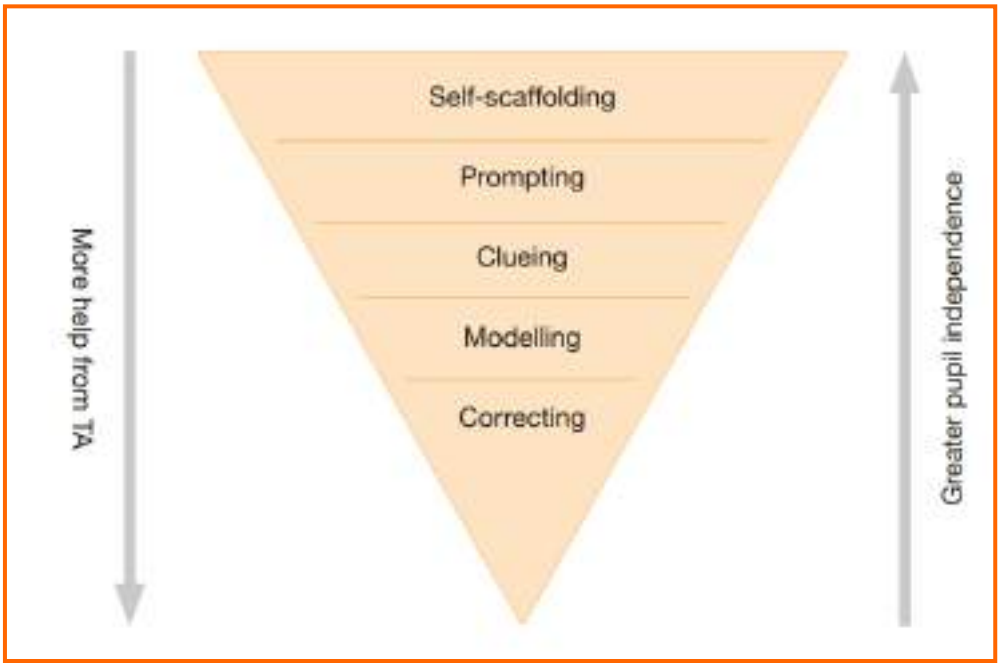






End of Lesson Assessment & Same Day Intervention

Marking informs same day intervention meaning that no children start the next lesson confused. All teaching assistants receive in-depth maths intervention CPD focused on their role, which ensures intervention fosters independence.



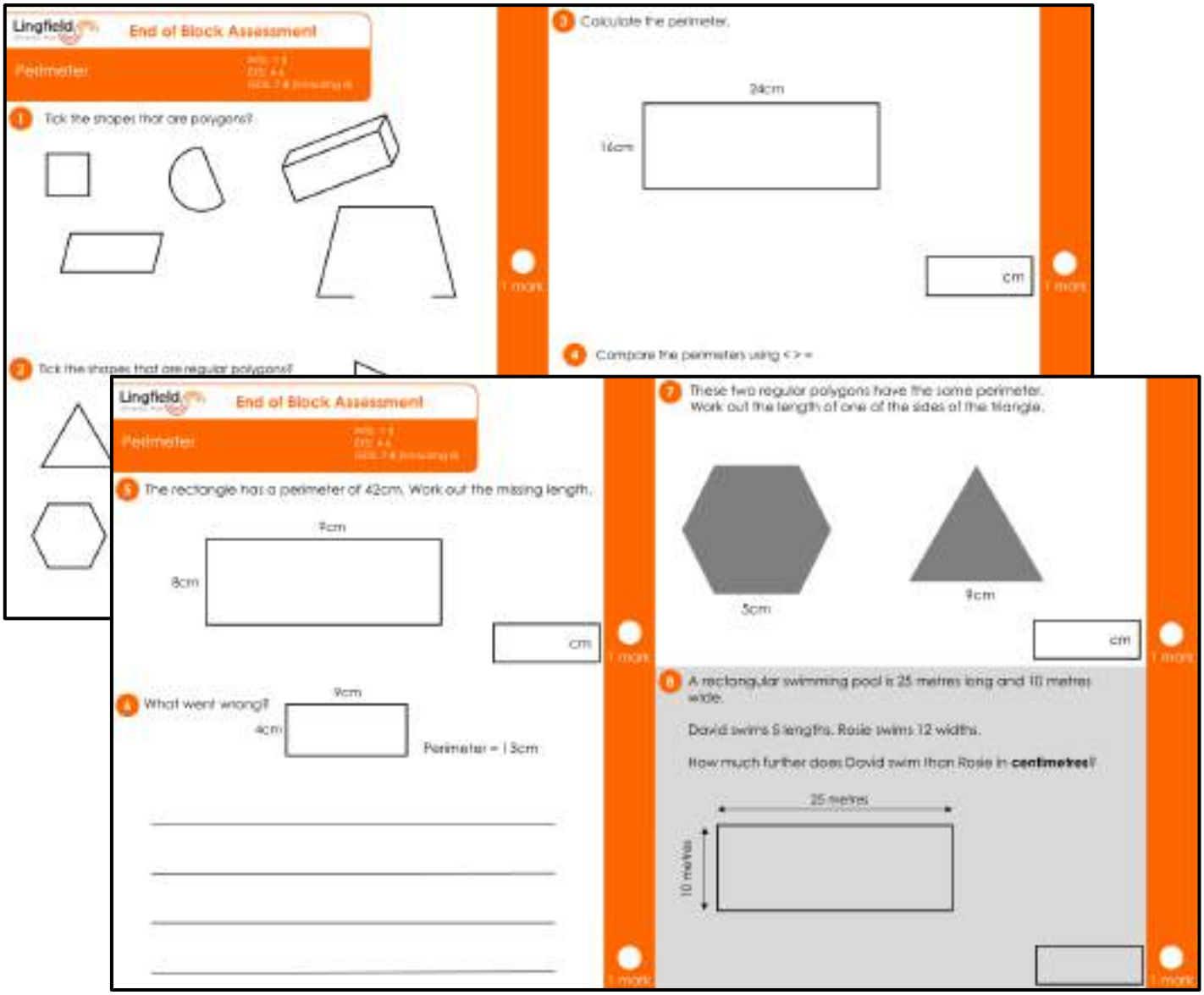
End of Block Assessments

Allow teachers to identify what children have and have not learnt.

GDS question to signpost confident mathematicians for 'stretch' lessons decided per unit.

Informs intervention and 'pause' lessons for those needing further consolidation.

Allows maths leads to evaluate the effectiveness of the curriculum. Includes reasoned response and problem-solving.

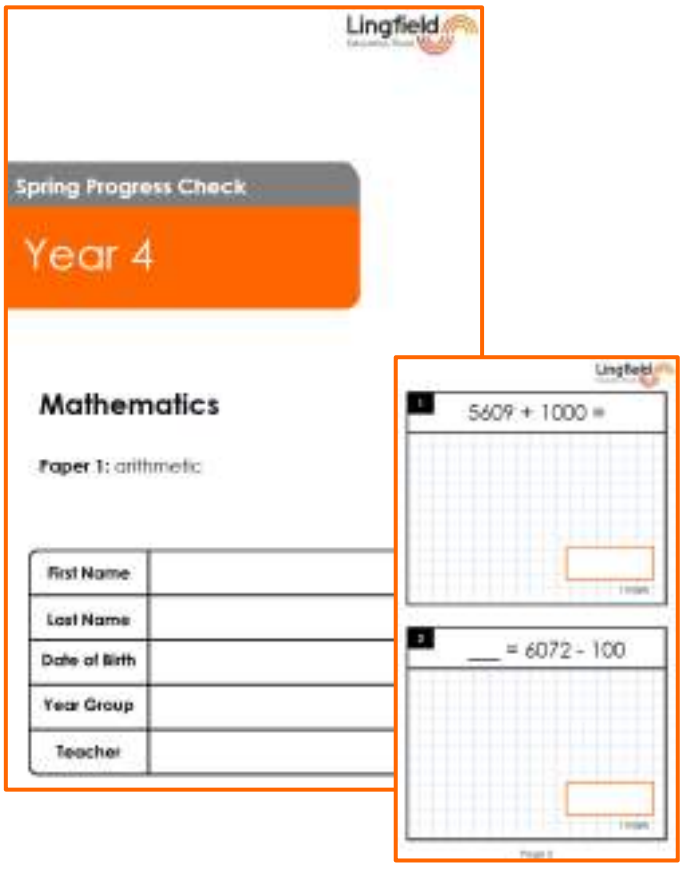


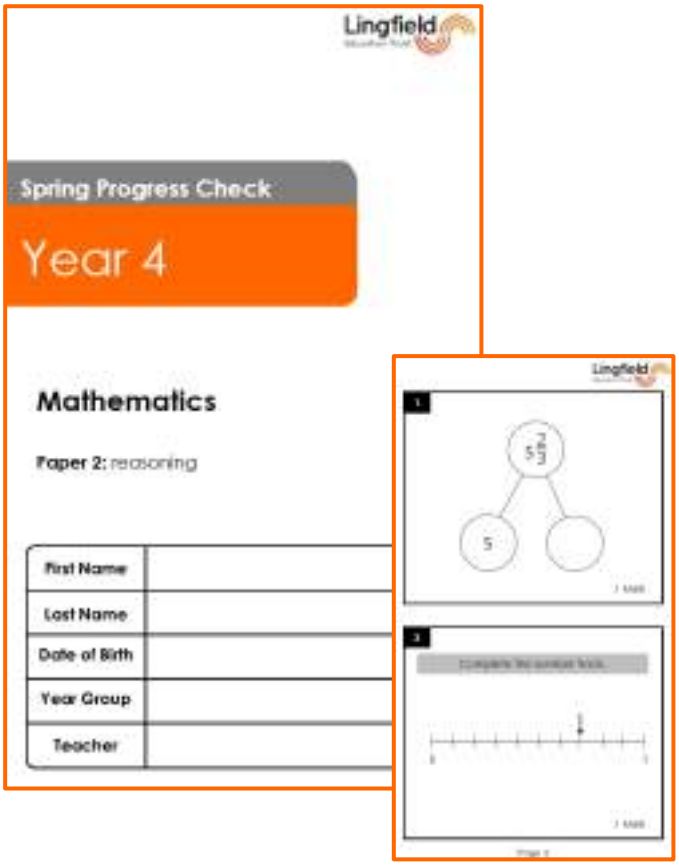
Summative Assessments

Summative assessments are administered when children are ready; when the content has been taught. They allow teachers to find out if children:

- can work on different maths concepts at the same time
- can link their maths learning together and solve multi-step and multi-domain problems

They also allow maths leads to evaluate the effectiveness of the curriculum.





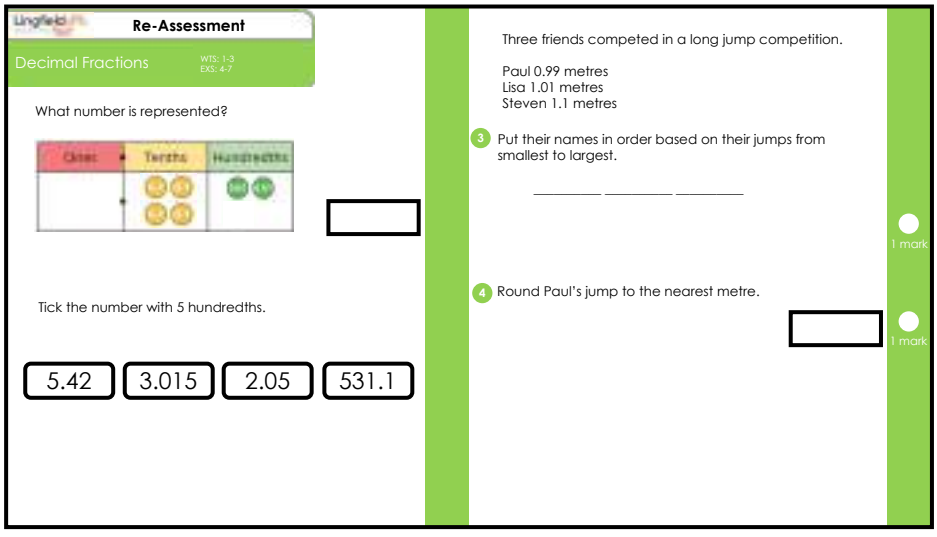
Assessment Tracking – Intervention - Reassessment

All assessments and teacher judgements are tracked to create an overall attainment level.

WTS cannot be an endpoint… When a teacher records a 'working towards' judgement this just the start of an intervention and re-assessment process until the child is judged to be 'expected after a re-teach' (EXS-R). This helps ensure children are ready for the next linked block of new learning as their gaps have been addressed.

Fact Fluency Checks						Summative			AfL			End of Block Assessments								
Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2	Summative Assessment 1 Raw Score	Summative Assessment 2 Raw Score	Summative Assessment 3 Raw Score	Autumn Term AFL Books, CfLs, Retrieval	Spring Term AFL Books, CfLs, Retrieval	Summer Term AFL Books, CfLs, Retrieval	Decimal Fractions	Negative Numbers	Short Multiplication & Short Division	Area	Calculating With Decimal Fractions	Factors, Multiples, Primes	Fractions	Time	Current Grade
25	25		21	27	28	22	20		WTS			EXS-R	EXS-R	EXS	EXS-R	EXS-R	EXS-R			WTS
25	25	28	30	26	24	41	35		EXS			EXS	EXS	EXS	EXS	EXS	GDS			EXS
14	24	22	22	27	29	28			WTS			EXS	WTS	EXS	EXS	EXS	EXS			WTS
24	25	28	30	29	30	30	29		EXS			EXS	EXS	EXS	EXS	EXS-R	GDS			EXS
19	23	7	25	28	29	19	26		WTS			WTS	EXS-R	EXS	EXS-R	WTS	EXS-R			WTS
24	24	30	30	28	30	28	34		EXS			EXS	EXS	EXS	EXS-R	EXS	EXS			EXS
5	19	15	0	14		16	26		WTS			EXS-R	EXS-R	EXS-R	EXS	EXS	WTS			WTS
25	25	6	8	17		30	19		WTS			EXS	EXS	EXS	EXS-R	EXS				WTS
25	25	29	29	25	25	25	16		EXS			EXS	EXS	EXS	EXS-R	EXS	GDS			EXS
25	25	27	26	27	29	29	34		EXS			EXS	EXS	EXS	EXS-R	EXS	GDS			EXS
25	25	29	30	30	30	47	43		GDS			EXS	EXS	EXS	GDS	GDS	GDS			GDS
17	18		16	26	21	25	25		WTS			EXS-R	EXS-R	EXS-R	EXS	EXS	EXS			WTS
25	25	29	30	30	30	28	28		EXS			EXS	EXS	EXS	EXS-R	EXS-R	EXS			EXS
25	25	30	30	29	30	45	33		EXS			GDS	GDS	EXS	GDS	EXS	EXS			GDS
25	25	27	30	30	30	41	44		GDS			GDS	EXS	GDS	EXS	EXS	EXS			GDS
16		11	20	19	23	17	19		WTS			EXS-R	EXS	EXS-R	EXS	WTS	EXS			WTS
21	25	26	30	30	30	31	31		EXS			GDS	EXS	GDS	EXS	GDS	GDS			GDS
25	25	24	25	30	25	33	25		EXS			EXS	EXS	EXS-R	EXS-R	WTS	EXS-R			EXS
25	25	27	30	30	30	35	36		GDS			EXS	EXS	GDS	EXS	EXS	GDS			EXS
22	22	26	29	27	29	34	28		EXS			EXS	EXS	EXS	EXS	EXS	GDS			EXS

A full set of re-assessments are available for each end of block assessment to ensure children have to think sufficiently hard to prove intervention has been successful.



Mathematics Curriculum Sequence

Nursery

Colours
Matching
Sorting
Number 1
Number 1 – Subitising
Number 2 – Subitising
Number 2
Pattern
Assessment
Number 3 – Subitising
Number 3
Number 4 – Subitising
Number 4
Number 5 – Subitising
Number 5
Number 6 – Subitising
Number 6
Length & Height
Mass
Capacity
Assessment
Sequencing
Positional Language
More & Fewer
Shape
Number Composition
What comes after?
What comes before?
Numbers to 5
Assessment

Mathematics Curriculum Sequence

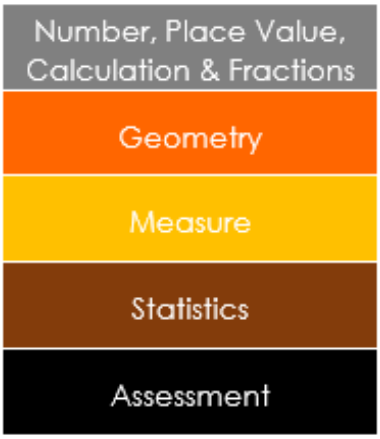
Reception

Subitising
Counting
Composition
Subitising
Comparison
Circles & Triangles
Shapes With 4 Sides
Cardinality & Counting
Comparison
Composition
Composition
Cardinality & Counting
Subitising
Mass & Capacity
Assessment
Ordinality
Composition
Composition
Comparison
Counting
Length & Height
Comparison
Composition
Composition
Composition
Explore 3D Shapes
Manipulate – Compose - Decompose
Assessment
Counting, Cardinality & Ordinality
Subitising
Composition
Composition
Comparison
Visualise – Build - Map
Subitising
Comparison
Counting
Pattern In Number
Assessment

Mathematics Curriculum Sequence

Year 1

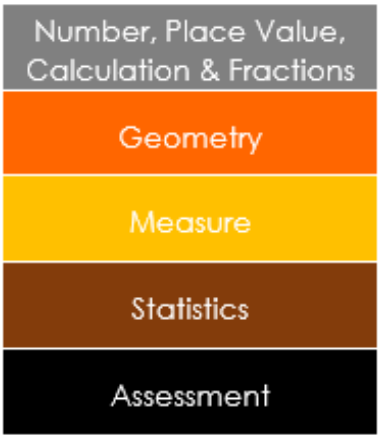
Reception Revisited & Counting Within 100	
Numbers to 10	Measures
Summative Assessment 1	
Addition & Subtraction to 10	
Geometric Reasoning	
Summative Assessment 2	
Numbers to 20	Measures
Counting to 100	
Unitising & Coin Recognition	Measures
Time	
Summative Assessment 3	



Mathematics Curriculum Sequence

Year 2

Numbers to 100	
Addition & Subtraction	Statistics
Summative Assessment 1	
Multiplication	Statistics
Division	Fractions
Geometric Reasoning	Fractions
Summative Assessment 2	
Addition & Subtraction of 2-Digit Numbers	
Money	
A Sense of Measure	
Time	
Summative Assessment 3	



Mathematics Curriculum Sequence

Year 3

Adding & Subtracting Across 10

Numbers to 1,000 | Measure

Right Angles

Summative Assessment 1

Mental Addition & Subtraction

Column Addition | Statistics

x2, 4, 8 Multiplication Tables

Summative Assessment 2

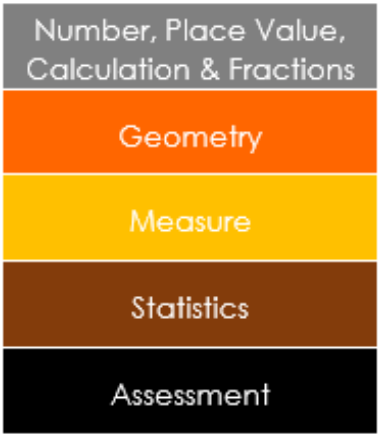
Column Subtraction | Statistics

Fractions

Parallel & Perpendicular Sides in Polygons

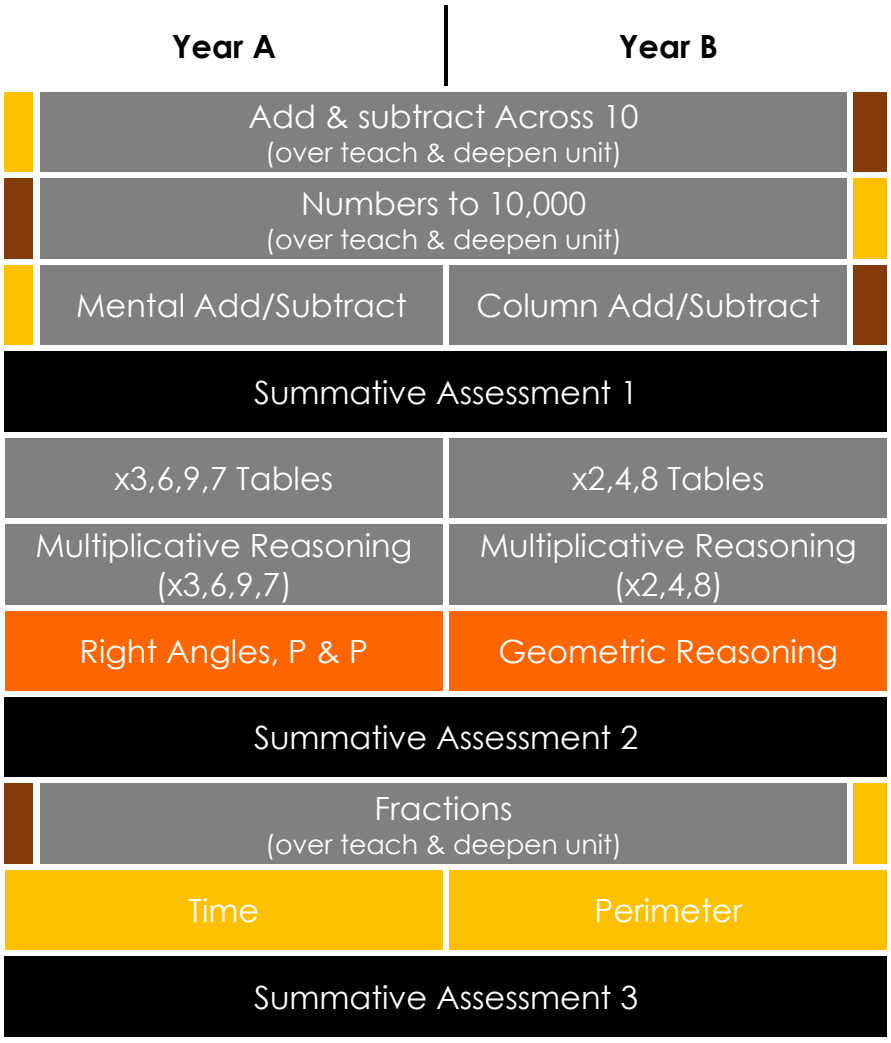
Time

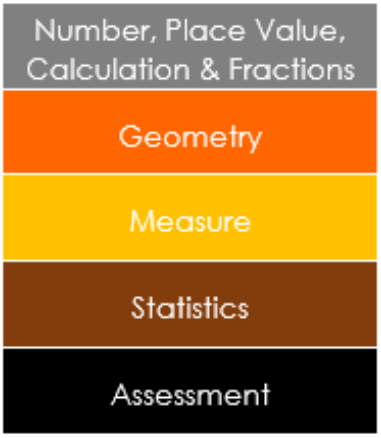
Summative Assessment 3



Mathematics Curriculum Sequence

Year 3-4

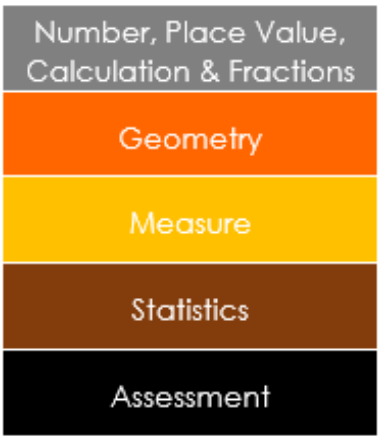




Mathematics Curriculum Sequence

Year 4

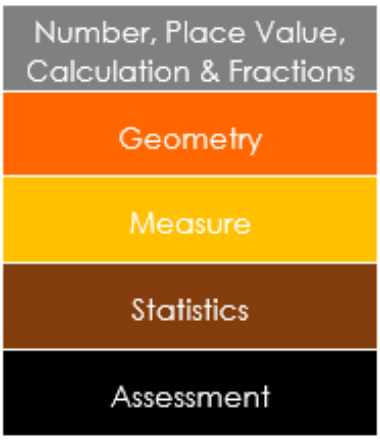
Review of Column Addition & Subtraction	Statistics
Numbers to 10,000	Measures
Summative Assessment 1	
x3, 6, 9 & 7 Multiplication Tables	
Multiplicative Relationships	
Perimeter	
Summative Assessment 2	
Fractions	
Geometric Reasoning	
Time	
Summative Assessment 3	



Mathematics Curriculum Sequence

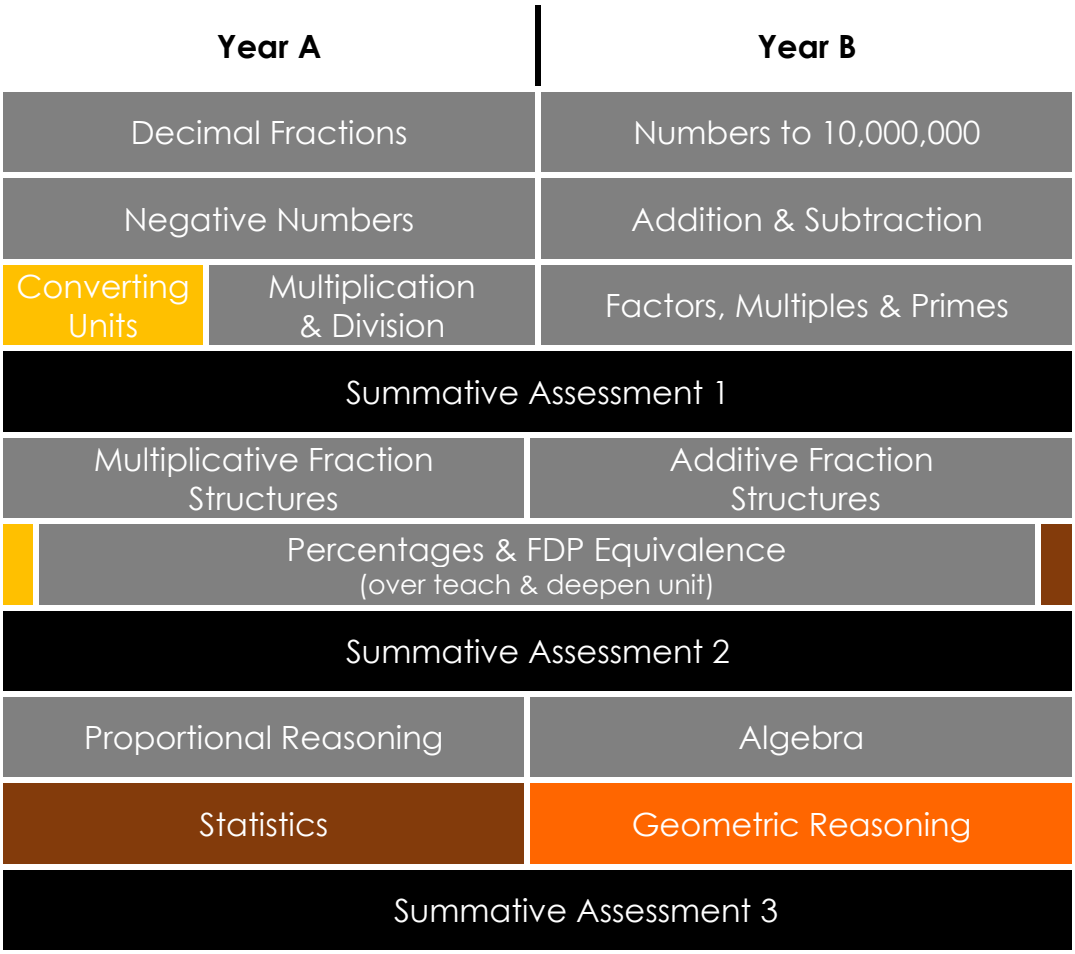
Year 5

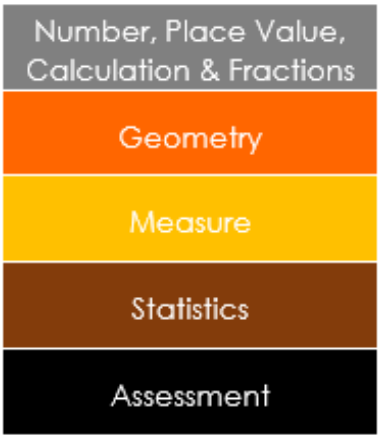
Decimal Fractions		Measure
Negative Numbers	Stat	Geo
Summative Assessment 1		
Short Multiplication & Short Division		
Area		
Calculating With Decimal Fractions		Converting Units
Summative Assessment 2		
Factors, Multiples & Primes		
Fractions		
Angles		
Summative Assessment 3		



Mathematics Curriculum Sequence

Year 5-6

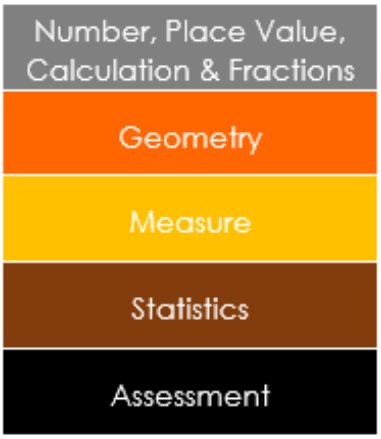




Mathematics Curriculum Sequence

Year 6

Numbers to 10,000,000	
Addition & Subtraction	
Multiplication	Measures
Division	Measures
Assessment	
Fractions & FDP	
Proportional Reasoning	
Geometric Reasoning	Measures
Assessment	
Algebra	
Statistics	
Assessment	
Calculator Crunch	
NCETM Year 7 Bridging Lessons	



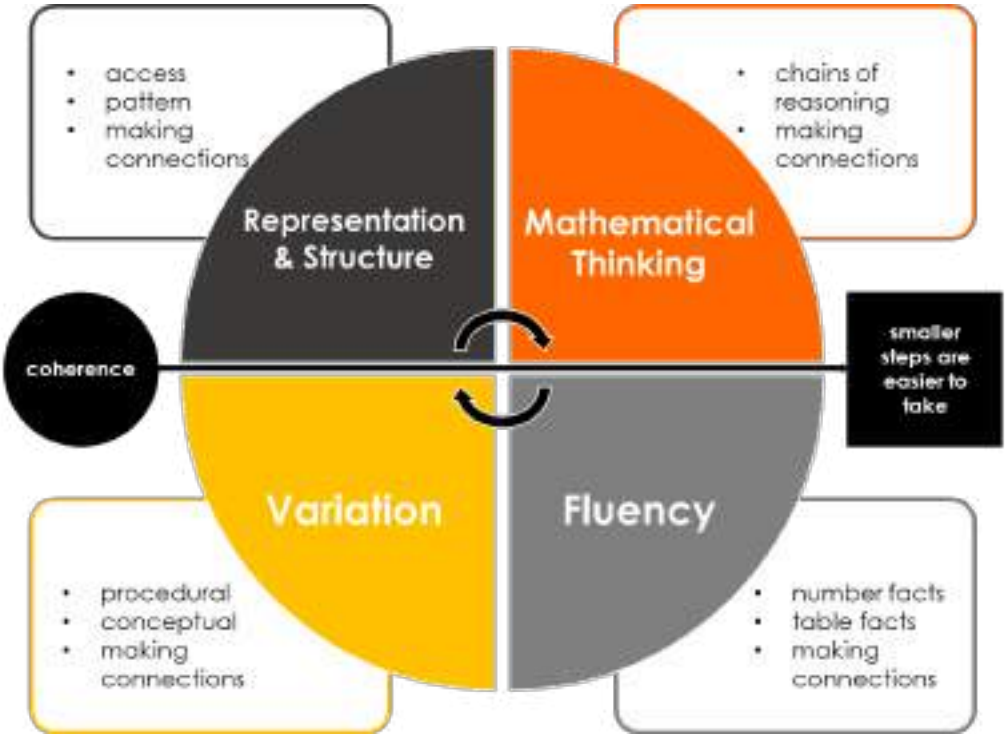
Pedagogy

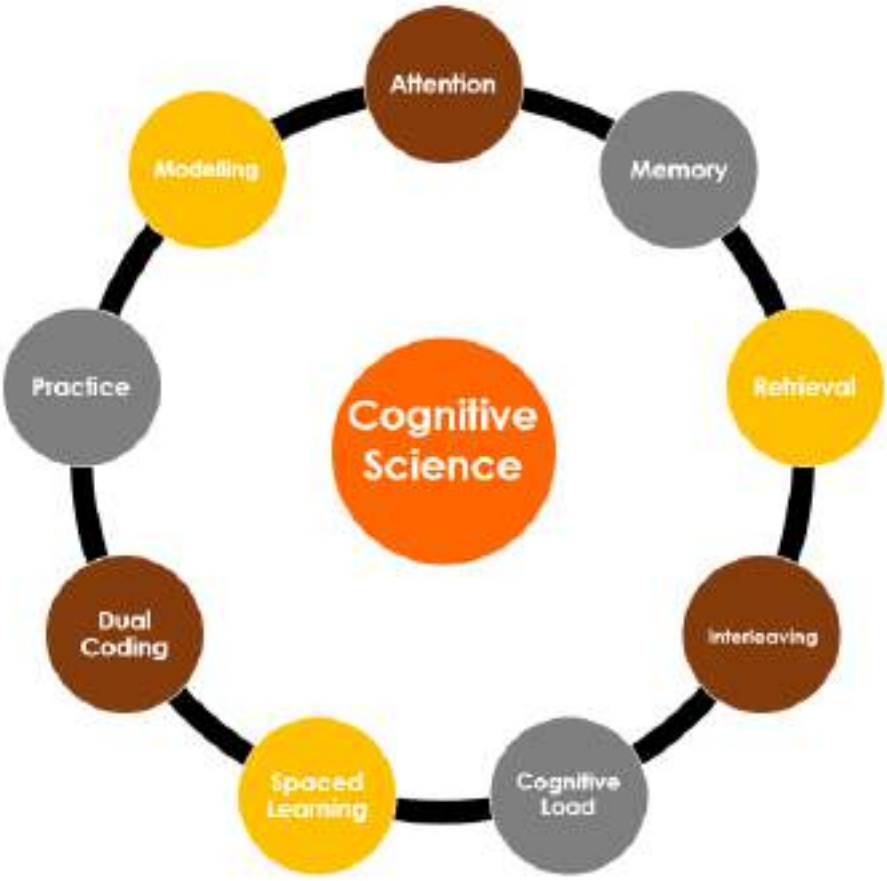
Pedagogy… *how we teach to ensure all of our children are included in enjoying and succeeding in maths.*

All children can enjoy and succeed in maths.

Cognitive Learning Science + Maths Mastery

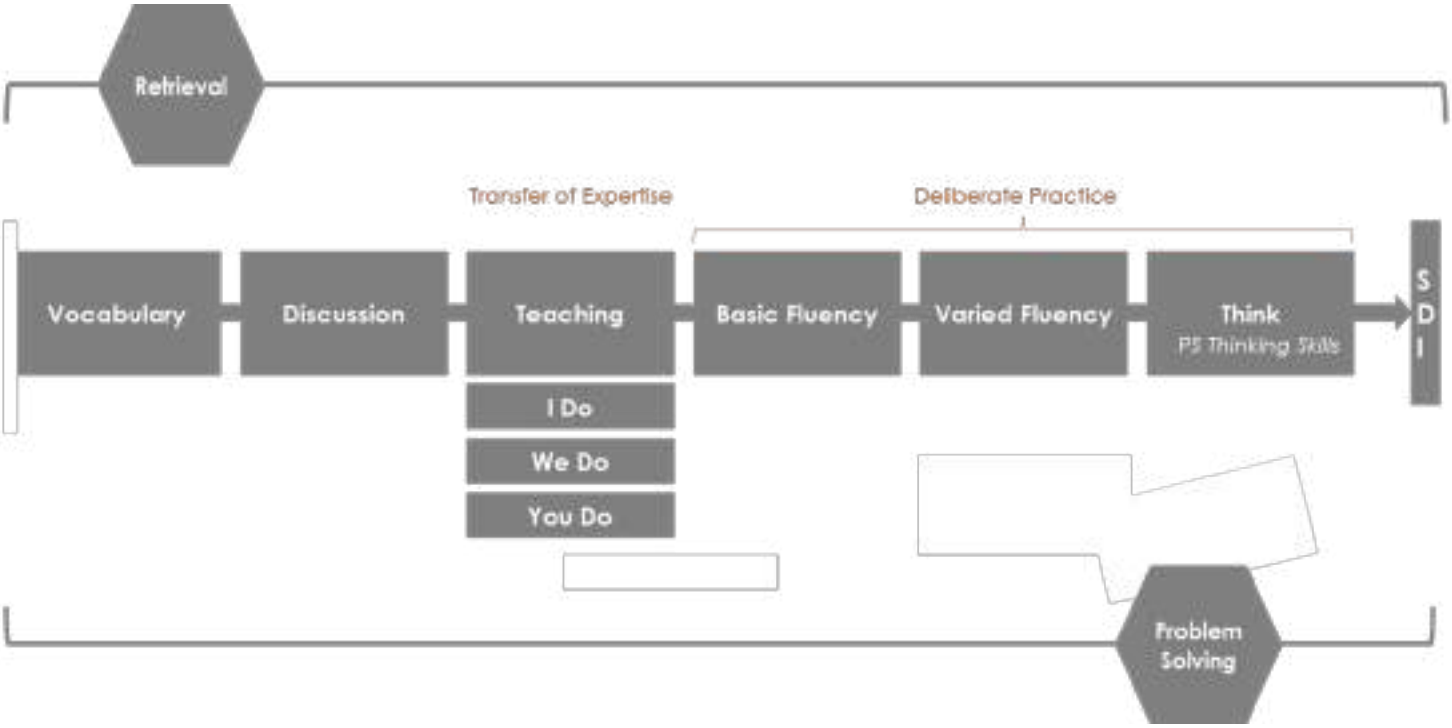
Our pedagogical approach to maths fuses together the 'big 5' principles of teaching for mastery (TFM) and cognitive learning science (see Lingfield Teaching Compass).



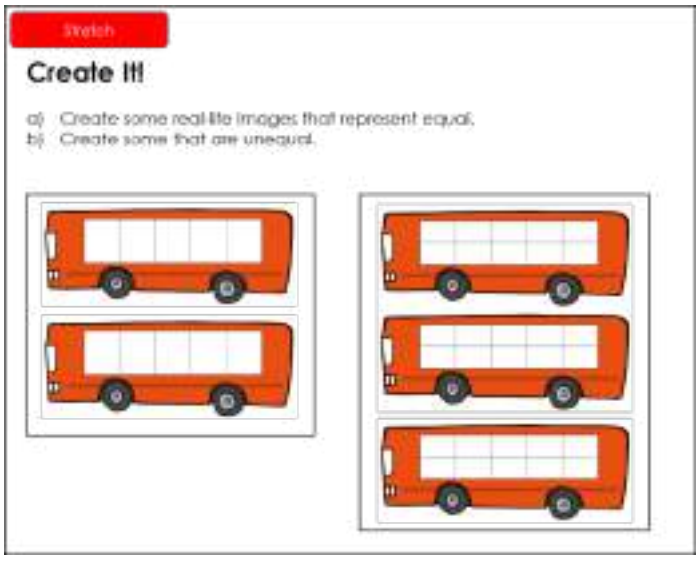


A Consistent Lesson Design

A consistent lesson design is followed in all maths lessons to ensure the vision, of a fused model of the NCETM 'big 5 of TfM' and key principles of cognitive learning science, becomes an experienced reality for staff and children.

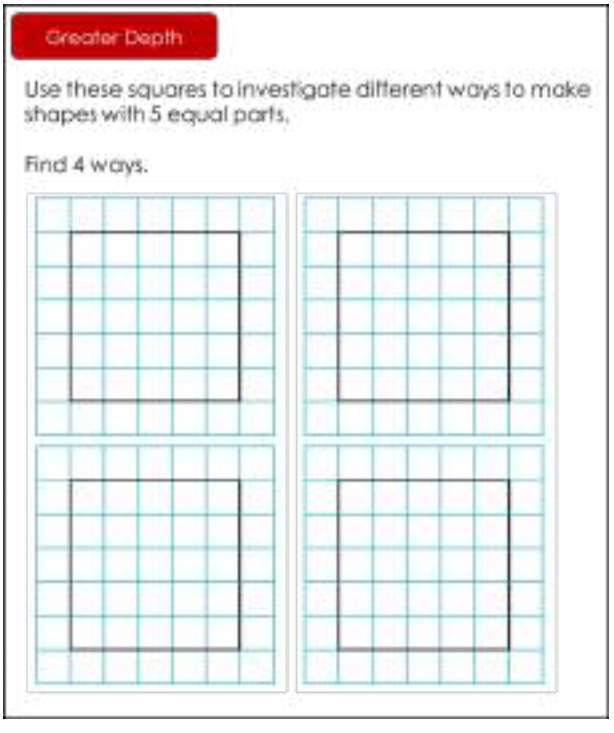


The guiding principle of our lesson design is that during the practice phase of learning all children get the time required to secure understanding. To allow this to happen those who have already grasped content complete 'stretch' and greater depth tasks to allow all other children to keep up. Then the class move on together again.


Stretch

Create It!

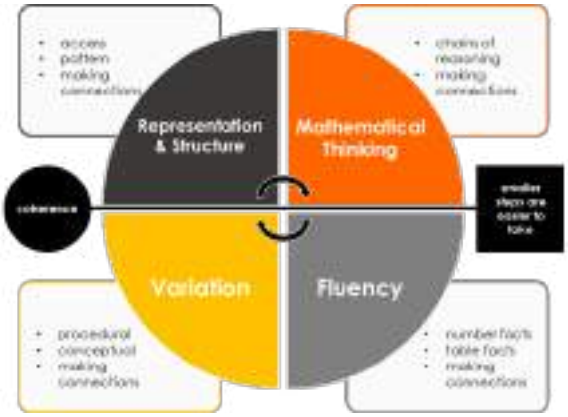
a) Create some real-life images that represent equal.
b) Create some that are unequal.


Greater Depth

Use these squares to investigate different ways to make shapes with 5 equal parts.

Find 4 ways.

Teaching for Mastery



Coherence

- The precise ordering of content in our curriculum, acts as scaffolding for our children in itself.

Fluency

- Fact fluency is developed within maths lessons but also within additional, daily fluency sessions. In these sessions, a deep conceptual understanding is developed using a range of manipulatives and visual representations. To ensure this leads to automaticity, daily automaticity practice is built into maths lessons and automatic recall is assessed every half-term.
- To ensure our children are truly fluent, our maths lessons are structured in a way that children have to apply their fluency to a range of variations and varied fluency prompts.

Variation

- To ensure too much variation early on does not lead to cognitive overload, our lessons are structured in a way that children work on what we decide is the most accessible representation/procedure to initially learn a concept/skill. Immediately after this, children work on a range of variations to strengthen their understanding. This initial 'basic fluency' phase tightly matches the direct instruction and working wall scaffold. The 'varied fluency' phase also allows us to pair this new learning with other areas of maths to build connections, for example comparison questions presented on a bar chart.

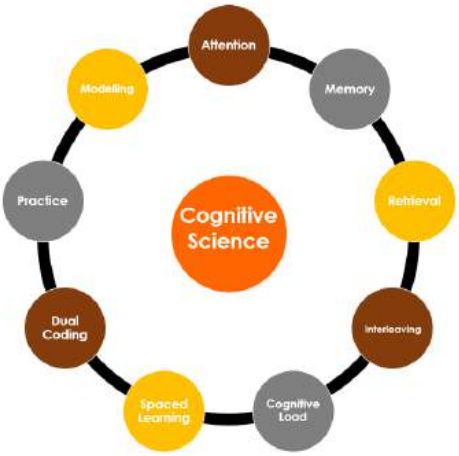
Representation & Structure

- Concrete resources are used to introduce new concepts in each year group of school, as they help children expose the structure of maths, for example our children use a tens frame to see how 7 + 4 can be represented as 7 + 3 to make a new ten leaving the 1 as a bit for ten and a bit as 11. When manipulatives are first introduced, specific lessons are planned to teach how to actually use the, before they are paired with mathematical content. We also know that for each piece of learning 'concreteness fading' needs to be applied so children can ultimately work without scaffold.

Mathematical Thinking

- We view reasoning as 'reasoning throughout' not as an end of lesson task. Children are asked to reason throughout maths lessons, including how new learning links to old, reasoning with the precise mathematical vocabulary taught and about how to tackle problems. To ensure all children are taught how to be problem-solvers, practice being problem-solvers and acts as independent problem-solvers, we have dedicated problem-solving lessons when a concept/skill has been secured.

Cognitive Load Theory

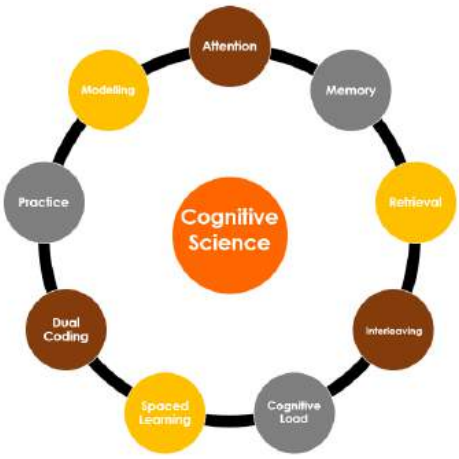


Cognitive Load Theory is central to our curriculum and lesson design: we know that for our cultural belief - *all our children can be mathematicians* - to be a lived reality requires that their working memory is not overloaded.

Our approach to maths addresses this in several ways:

- Extraneous visual and auditory stimuli are removed where at all possible, for example lesson slides and tasks have only what is required on them and teachers say just what is needed.
- The curriculum is built around small steps.
- Our lesson delivery model (LDM) ensures children are taught key vocabulary and fact fluency before it becomes a barrier in the lesson.
- The LDM is built around a robust *I do, We do, You do* model so children are instructed in small steps.
- Varied fluency and variations are built in once the core concept has been secured using our chosen accessible representations and procedures.
- We never want fact fluency to be a barrier to wider maths competence and therefore we have daily, dedicated fluency sessions for all year groups.
- Likewise, we never want a lack of time to rush fluency or prevent problem-solving, therefore we have dedicated problem-solving lessons to ensure all children can be taught problem-solving, practise problem-solving and independently solve problems – once fluency in an area has been secured.

Interleaving & Method Selection

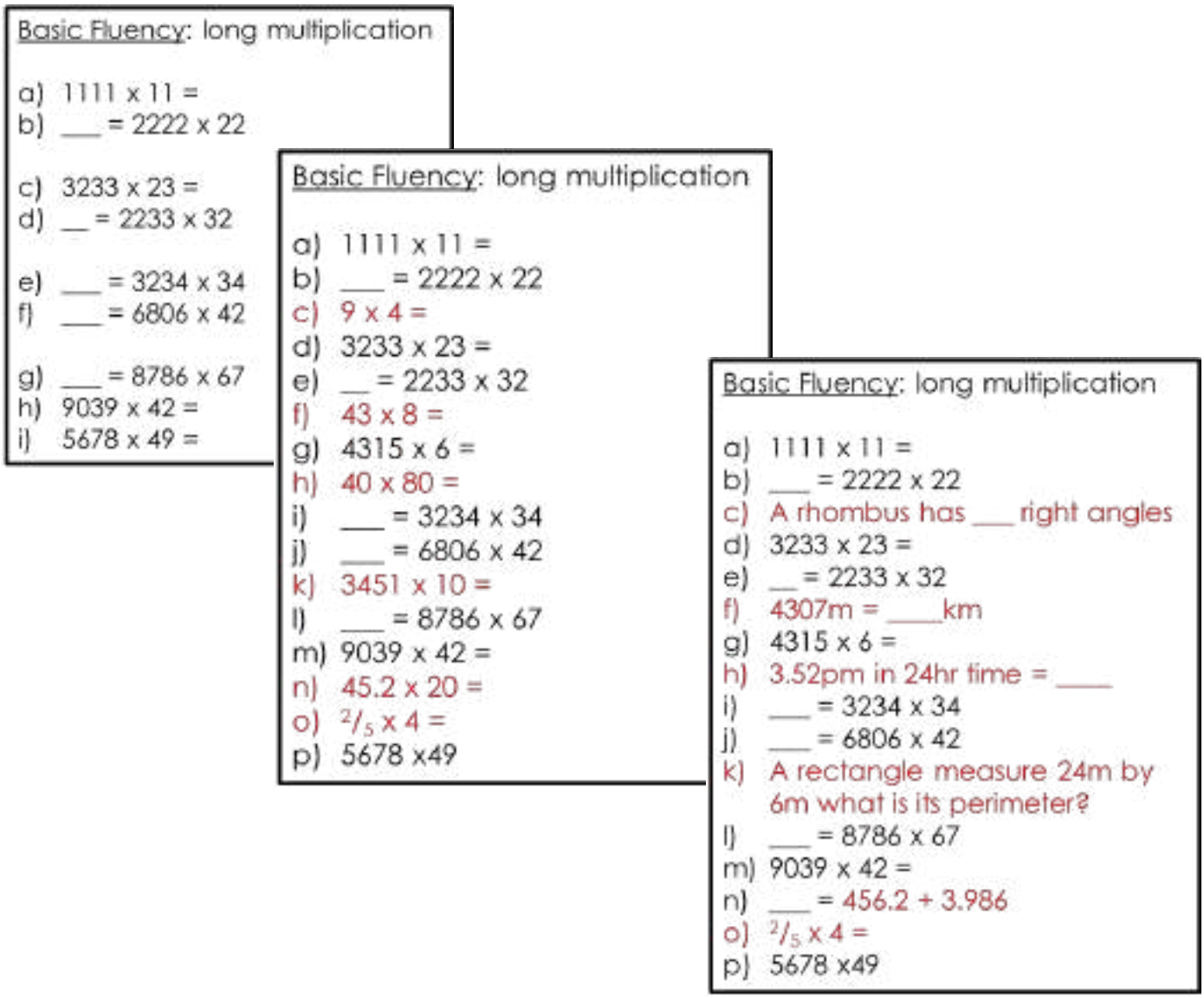


To ensure our children are presented with the optimal amount of desirable difficulties our basic fluency tasks are designed with the principles of interleaving and method selection in mind.

As children regularly have to come off the lesson content question and attend to some interleaved content, they are constantly having to 'reload memories' of the lesson input – they can't just drop into routine.

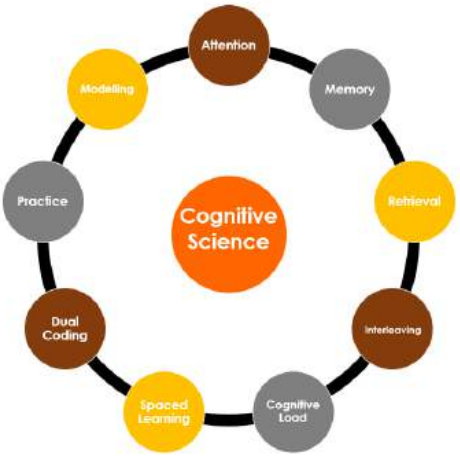
For children, who may need further scaffold with the lesson content, we use our *You Do* lesson component to decide which children work on the 'interleaved' task and which work on the 'blocked' task until secure.

Based on research, interleaving is only used in KS2.



Systematic, Spaced Retrieval

To ensure the content learnt in maths lessons is retained, all learning is built into our systematic, spaced retrieval plans.



Retrieval Sequence

Year 4: Autumn

Week	Addition	Subtraction	Multiplication	Division	FDP	GSM	RPS	Counting
1	Bridging 10	Bridging 10	Powers of 10	Powers of 10	Fraction Vocabulary	Vertical & Horizontal	Y2 Place Value	Count for/back 10, 100, 1000
2	Place Value	Place Value	Multiplicative Fact Strategies	Multiplicative Fact Strategies	Unit & Non-Unit Fractions	Length	Y2 Place Value	Count for/back 10,100,000 from any
3	Bar Models	Bar Models	Doubles	Halving	Fraction Sense	Parallel & Perpendicular	Y2 Additive Structures	Count for/back in 25s and 250s
4	Mental Strategies	Mental Strategies	Doubling odd TH numbers	Halving numbs with odd T or H	Adding Fractions	Mass & Capacity	Y2 Additive Structures	Count for/back in 50s and 500s
5	Column Method	Column Method	Scaled Facts	Scaled Facts	Subtracting Fractions	Statistics	Y2 Multiplicative Structures	Count for/back in 20s and 200s
6	Bridging 10	Bridging 10	Mental Methods	Mental Methods	Unit fractions of amounts	Analogue Time	Y2 Multiplicative Structures	Count in 2,10,5
7	Place Value	Place Value	Powers of 10	Powers of 10	Fraction Vocabulary	Right Angles	Y2 Measures	Count in 2,4,8
8	Roun							
9	Bar M							
10	Me Strat							
11	Column							
12	Bridg							
13	Place							
14	Roun							

Lingfield

Retrieval

Class Counting forwards in 10s from 87 to 217

Place Value & Addition

What is the value of underlined digit?

3<u>4</u>5

Place Value & Subtraction

What is the value of underlined digit?

<u>2</u>07

Multiplication

Express as a repeated addition equation.

3 x 5 = 15

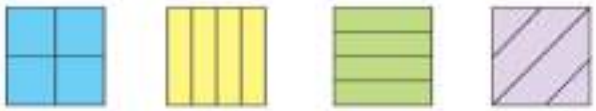
Division

Write the two inverse division facts.

6 x 8 = 48

Fractions

Which image does not represent quarters?



Geometry, Measures & Statistics

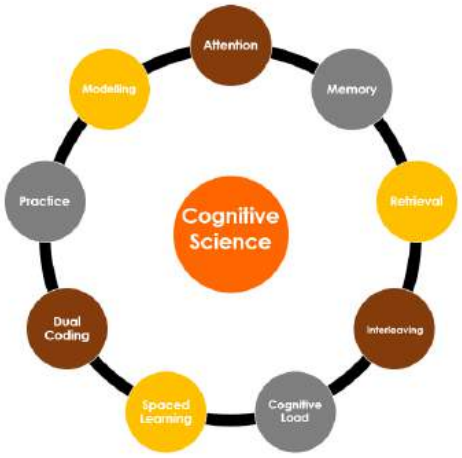
Which is the equivalent length?

45mm

- 45 metres
- 4 millimetres and 5 centimetres
- 4 centimetres and 5 millimetres
- 45 micrometres

Spaced Learning…

Fact Fluency – Never A Barrier!



Addition/subtraction and multiplication/division table facts are crucial to children enjoying maths and being successful at it.

We recognize that typical approaches, which are based around a one-off two-week block of work, are not effective in ensuring all children learn all of these facts to automaticity. The cognitive load is too high.

We have applied the concept of spaced learning to our fact fluency with children developing a deep conceptual understanding that leads to automaticity over a greater amount of time.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y1	Early Number	Addition facts to/within 5	Addition facts to/within 10	Addition facts to/within 10	Additive facts to/within 10	Additive facts to/within 10
Y2	Addition facts from 10 to 20	Addition facts from 10 to 20	Additive facts from 10 to 20	Additive facts from 10 to 20	Addition bridging 10 facts	Addition bridging 10 facts
Y3	Additive bridging 10 facts	Additive bridging 10 facts	x2, x10, x5 multiplication facts	x2, x10, x5 multiplication facts	x4, x8 multiplication facts	x4, x8 multiplication facts
Y4	x3, x6 multiplication facts	x3, x6 multiplication facts	x7,x9 multiplication facts	x7,x9 multiplication facts	Multiplication facts to 12 x 12	Multiplication facts to 12 x 12
Y5	Multiplication facts to 12 x 12	Multiplication facts to 12 x 12	Additive & multiplicative facts	Additive & multiplicative facts	Additive & multiplicative facts	Additive & multiplicative facts

Direct Instruction And Enquiry

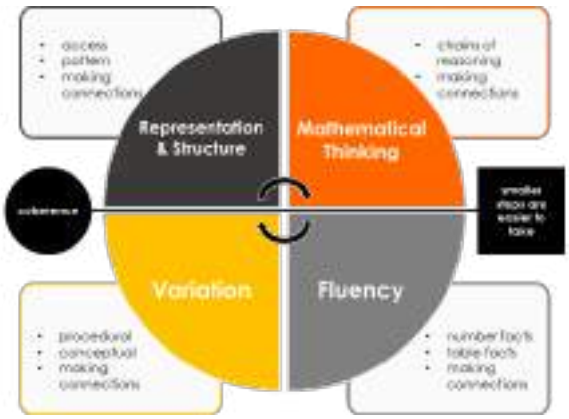
Direct instruction using an ***I do, We do, You do*** model lies at the heart of our system of the transfer of expertise.

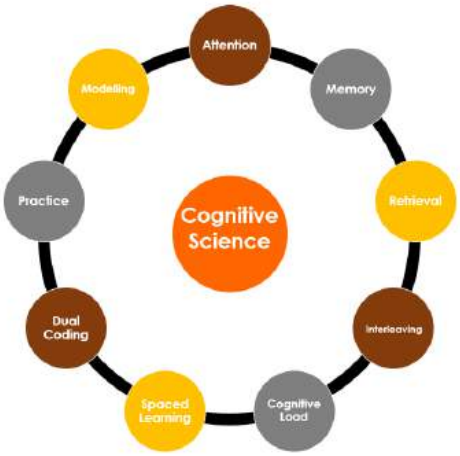
New content is delivered through direct modelling in the ***I do*** phase.
Further expertise is then transferred through the ***We do*** phase, where teachers and children work together in a **faded scaffolding** way on a concept or skills. Rich reasoning questions lie at the heart of this teacher-child phase.

Following this children work collaboratively on the learning with guidelines and roles so that both participants are active learners.

To ensure that staff know whether their teaching has been received by all, or which children may need further support in a guided-group, the ***You do*** phase is completed before children work independently. We want them to practice and encode success not misconceptions. This is our check.

Based on research we have a discussion component early on in our lesson deliver model (LDM) that allows children to **enquire** and discover – through a clever prompt - what the new learning for the day is and why it is important – we find that children alighting on this themselves is effective at engaging all learners as they have found their own purpose – something they do not yet know.





I do

We do

You do

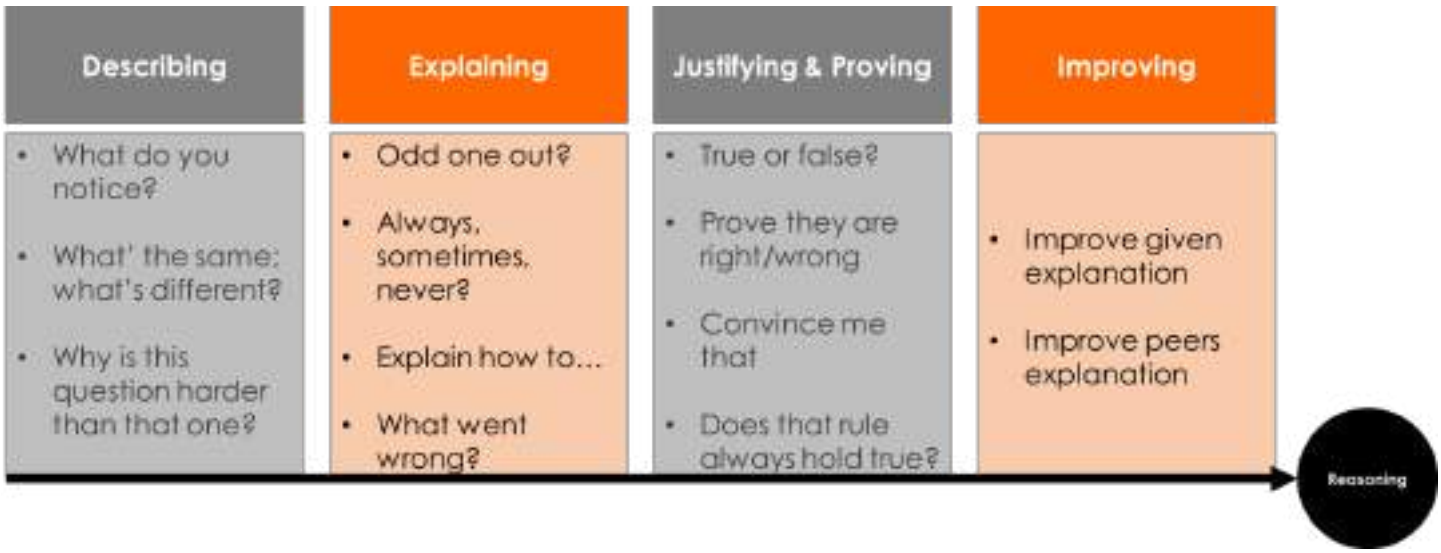
Systematic Teaching of Reasoning

To ensure that our children are proficient in reasoning about mathematics, we have a rigorous, systematic approach.

Precise mathematical vocabulary is directly taught, practised and applied.

Reasoning is used through lessons using 'think-pair-share' structures.

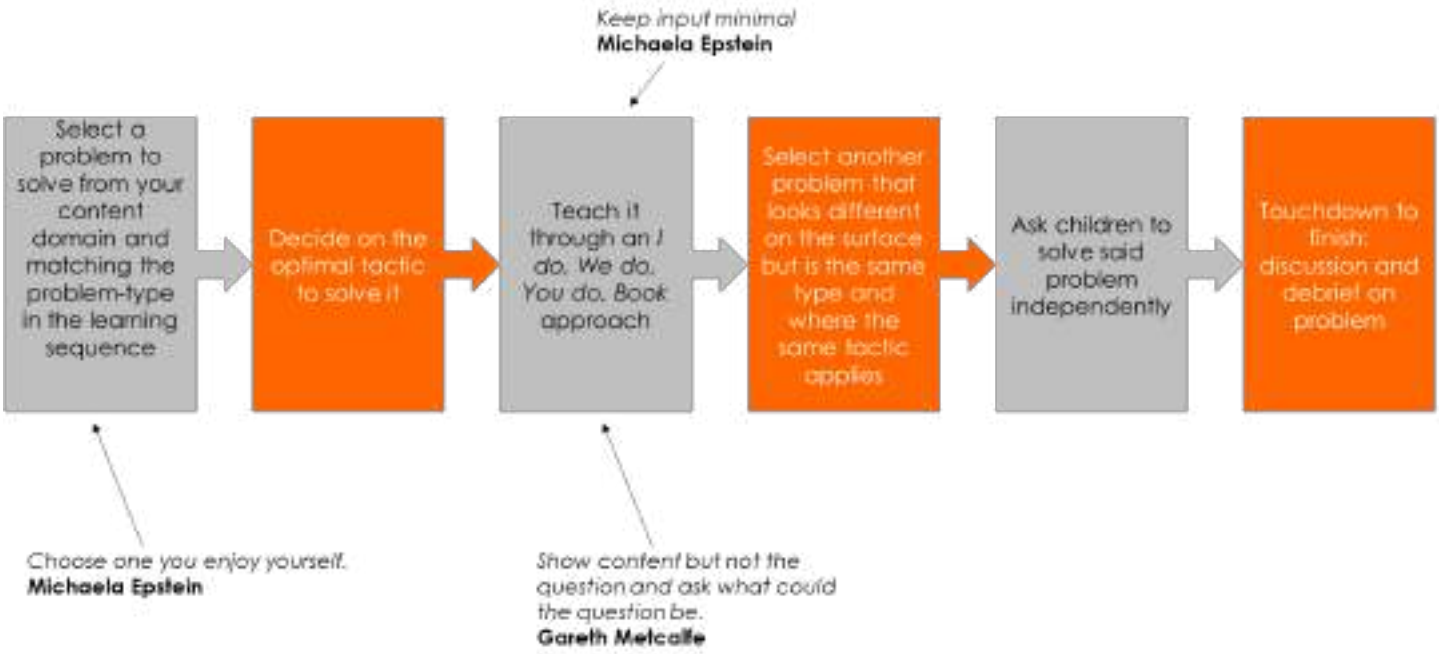
Every lesson includes a 'think' *dong nao jin* task based on the prompts below. These help children to develop their problem-solving-thinking skills so they can apply them to a wide range of routine and non-routine problems.



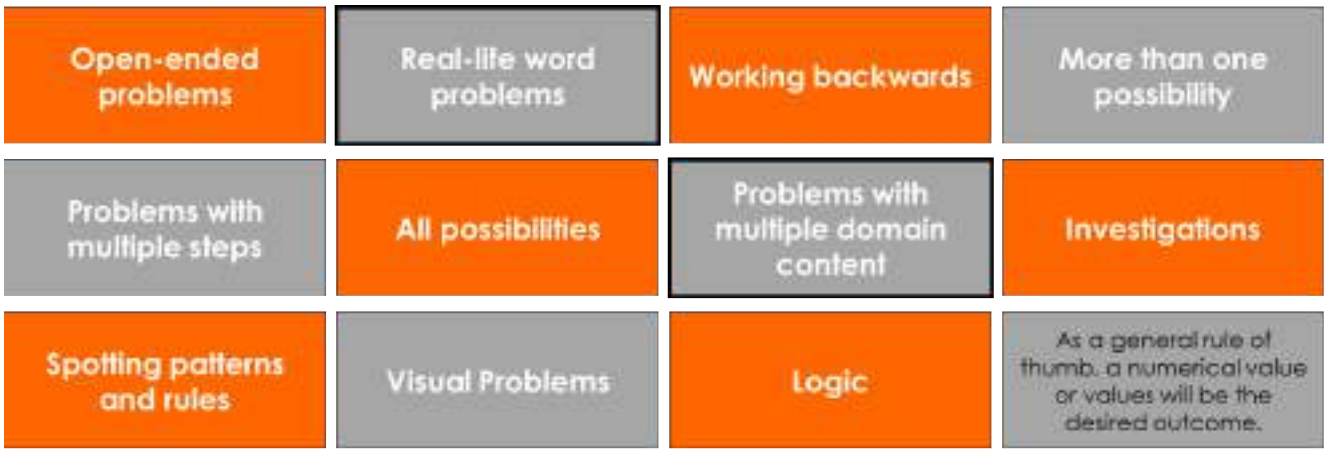
Our key reasoning prompts are used to frame discussions in other subjects too. The rationale is that as our children develop comfort and competency with the reasoning sentence frames in other contexts, when they are asked them apply them to novel maths ideas, they only have to use working memory on the maths.

Systematic Teaching of Problem-Solving

All children are taught a full range of problem-solving skills; all are exposed to a range of problem-types; all practice a range of skills; and all independently apply learnt skills.
Problem-solving is taught when underlying content is secure.
We have a specific LDM for our dedicated problem-solving lessons that ensures it is a problem-solving approach for all.



Problem types are built into learning sequences to ensure children are systematically taught each skill, each year.



Based on National Curriculum guidance, KS1 children do less problem-solving. Year 1 are introduced to it in Spring and then just one lesson per block is planned for in KS1 to ensure fluency takes precedent.
As children progress through school, they are exposed to a wider range of problem types linked to units of work.

Alongside this, each year group has one half-termly generic problem-solving skills lessons with the aim being that these skills can then be further applied in content-based problem-solving lessons.

Problem-Solving Skills

The underlying problem-solving skills to teach are:

- **Term 1:** Trial and Improvement… Resilience
- **Term 2:** Systematic approach
- **Term 3:** Working collaboratively
- **Term 4:** Finding starting points
- **Term 5:** Visualising
- **Term 6:** Conjecturing & Generalising

- **Underlying Skill:** organising workings (all lessons)

EYFS Maths Pedagogy

Culture… to make lovers of maths

Curriculum (as detailed as primary)

Reasoned introduction… wonderings (valued wonderings)

Direct Instruction (ideally in a circle)

Focused, adult-led Maths play

Purposeful, adult-initiated maths play built around Shrec

Child initiated, free play using the maths

Lots of chances for **fine motor skills** – this is a real barrier for some of our YR chn in terms of pencils and manipulating manipulatives!

Dedicated maths area that had chances to revisit the key areas of early maths (matching, sorting, ordering, comparing, patterning, spatial reasoning.

Also lots of maths picture, story books available in said area

Simple shared whiteboard system to note who still needed to experience an area or had a gap to address

We know our target group and WE FIND THEM!

Mathematical Routines

- Register on five frames
- Snacks from 5 frames
- Paying for snacks
- Tidying up through shadowing
- Count in lines

Mathematical Input

- Subitising starter
- Sat in circle / horseshoe
- Direct teaching
- Discussion
- Reasoning
- Choral recital
- No opt out
- Relatively short
- **Teach how to use areas**
- Master the Curriculum with a daily NS key skills starter in YN
- Mastering Number in YR enhanced with WR shape and measure units.

Maths Through Provision (in and out)

Content Linked

- Defined areas
- Engaging, lovely, enticing areas
- Activities directly linked to the input some via adult some independent as you have taught the play
- Vocabulary on boards for adults
- Maths area used for further focus group teaching **while others play maths**
- Tracking of areas

Always Out Maths

- Spatial awareness
- Sorting
- Matching
- Ordering
- Comparing
- Patterning
- Subitising
- Counting
- Number composition
- Picture prompts

Assessment

- Shared SDI board
- Areas Tracking
- LET Trust Ready Documents

Maths Play

Key 2YO Focus

Schematic Play

A repeated action that children use to learn about the world

Posting
Emptying
Enveloping
Filling
Rotating
Transporting
Connecting & Lining-Up
Enclosing

Early Maths

Key Nursery Focus

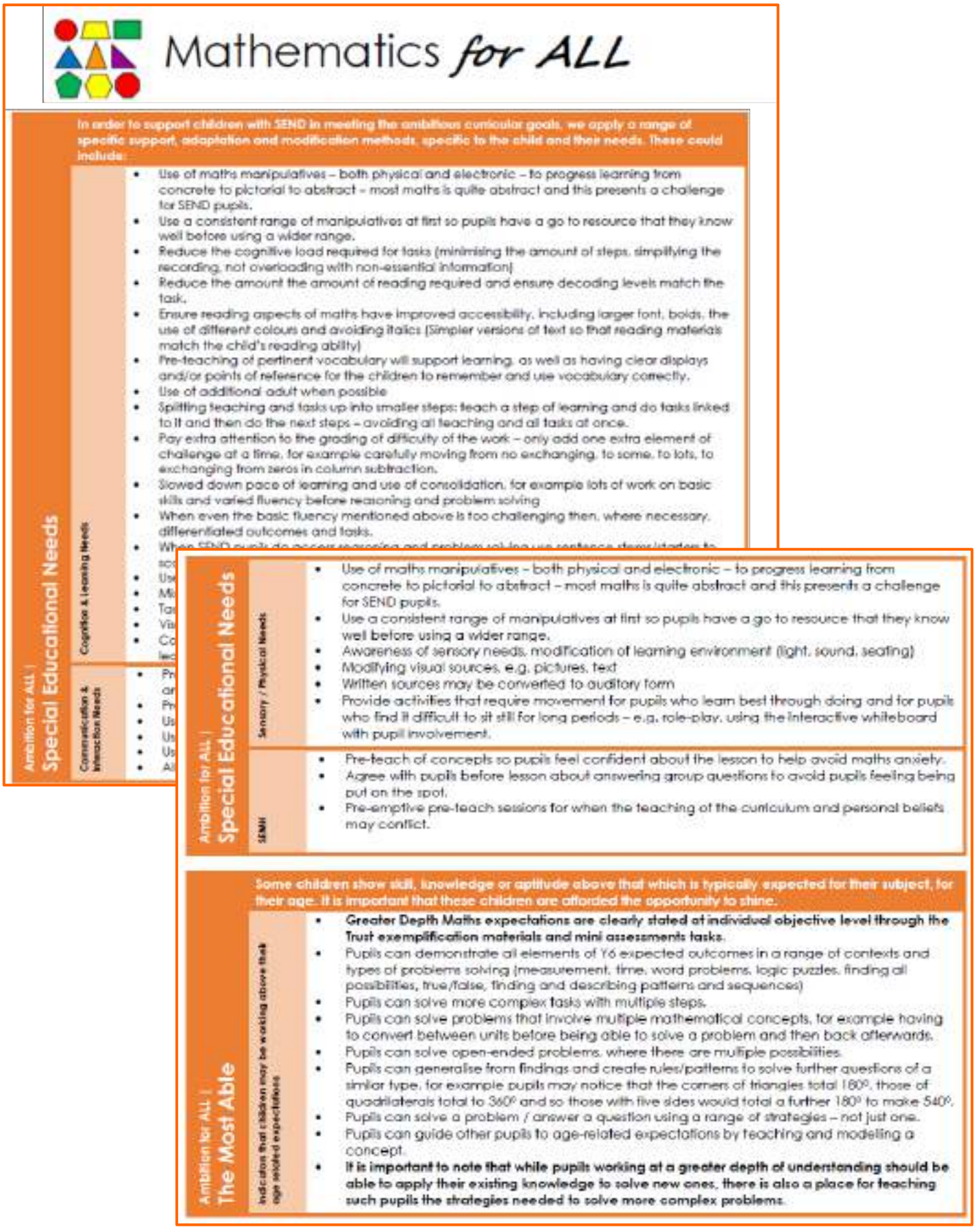
Early Number

Key Reception Focus

Subitising
Counting
Composition to 10

SEND & GDS

To ensure all our children are supported and challenged to the highest possible standard, our maths curriculum and pedagogy meet all the standards of LET Curriculum For All.



SEND & Supporting Children Working Behind ARE

Children within 2 years of the intended age-related curriculum

Ensure children with gaps identified in the prior- learning check have had their remediation and are re-checked (while the rest do deepening activities).

Pre-teach session

Introduce children to the lesson's concept/procedure and bridge some of the gaps in the current understanding. For example, a Y6 child approaching a PV lesson 1,000,000 who has knowledge to 1,000 (Y4). The pre-teach would look at how place value builds from what they know to 1,000,000 using representation and structure.

Within the lesson

- I do: adults ensure these children particularly are attending to the input and drawing children's attention to the working wall where there is also an example I do.
- We do: adult monitoring during 'we do' phase to nip errors in the bud straight away or for questions to be asked therefore adults need to observe these children during this phase. Ensure you use the 'we do' guidance poster as this is key to moving these children.
- You do: regrouping based on checks for understanding (you do) so independent work is scaffolded by an adult.
- Focus group work: plan in advance the extra modelling they will need
- Adapted task design, for example visual prompts.
- Use of technology – provide children with a video of worked examples to refer back to when working (iPad screen record feature – a personalised video working wall).
- Intention being to still to BF, VF and Think.

SDI

Any further misconceptions from the lesson addressed rapidly before the next lesson or if children did not get VF and Think finished it will need doing.

'Stop and think, is any provision outside of the classroom better than what they would receive in the classroom?' There may be specific occasions where alternative provision is the best option.

Children working more than 2 years adrift but with NO cognition issue

- A parred-back and documented curriculum looking at place value and number to encourage catch-up.
- Teacher to find time within each day to ensure these children have input for their next step before they do their independent work in the maths lessons with their peers.

Children working more than 2 years adrift with cognition issue

- Use of PIVATS to track own curriculum but not an accelerated curriculum – progress against their own next steps.
- Teacher to find time within each day to ensure these children have input for their next step before they do their independent work in the maths lessons with their peers.
- These children will need more practice than others so an input every day may not always be needed; it could be a day of input and practice and then another day of practice.
- These CAN and MUST work on varied fluency, reason and solve problems, if you find the exact level they are working at. They need to do these phases to properly learn but at their level.

Targeted Intervention

Alongside the lesson-based model above those to be targeted for academic intervention on:

- Subitising – ensure to go back and check children can subitise both perceptually and conceptually
- Doubles and halves
- Bonds within 10
- Bonds to 10
- Bridging 10
- Bridging other 10s
- Multiplication tables
- Place value

These facts open up nearly all maths and need prioritising.

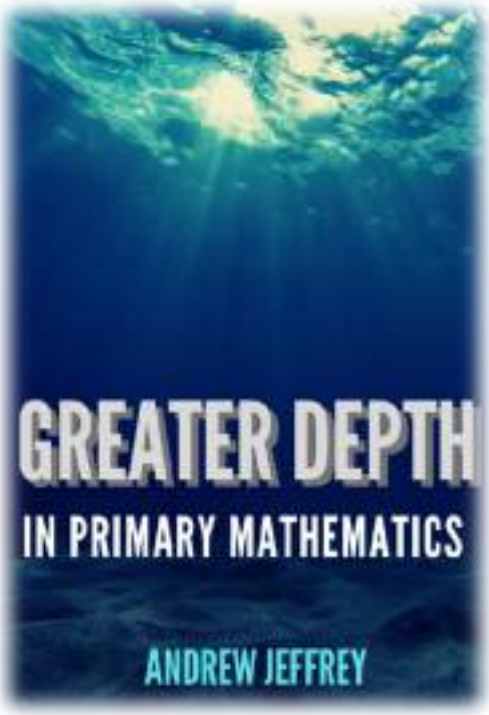
Greater Depth

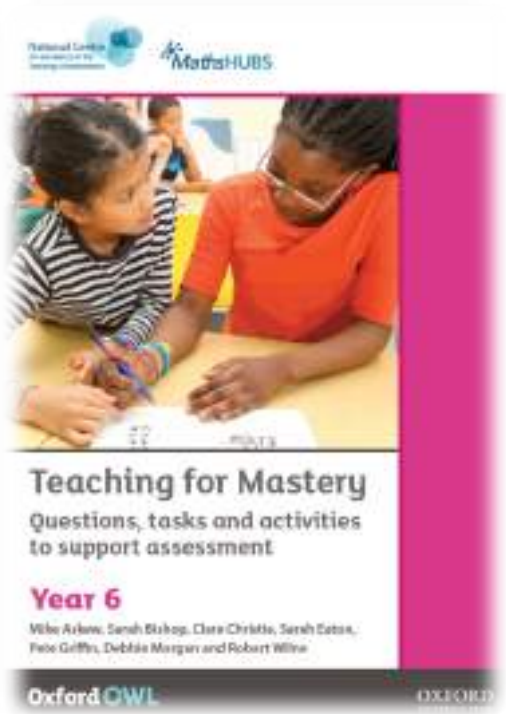
Children who grasp concepts quickly and confidently are challenged through two layers of greater depth work within lessons:

- 'Stetch' tasks are used after each to task to extend thinking, while also allowing other children to catch up thus allowing our classes to move together.
- Greater depth tasks are used at the end of learning steps to allow confident mathematicians extend their understanding further. **The intention is that all children are competent enough to complete the greater depth task.**

Our greater depth prompts are drawn from the two sources pictured below and are summarised into a list of 7 key ideas:

1. Why is x the answer?
2. And another…
3. Same and different?
4. Always, sometimes, never?
5. How not what
6. What's missing? (working backwards)
7. CPA to prove





CPD

Lingfield Education Trust

CPD… *how we ensure all of our staff are competent and confident in their teaching of maths.*

All children can enjoy and succeed in maths.

A true mastery approach includes all staff.

We apply the mastery approach to our staff CPD model to ensure all teachers are as skilled as possible to teach maths. All staff means SLT, teachers and support staff!

Maths Lead CPD

NCETM Central Team

National Experts

Maths Lead CPD

LET Maths Network

NCETM Maths Hub

National CPD Lead Visits (e.g Mark McCourt, Steve Wren, Dr Debbie Morgan)

TfC Sunderland

Teacher CPD

Monitoring & Assessment Evidence Drives CPD

Whole-School

Individual

LET Maths Network

NCETM Maths Hub

Teaching Assistant CPD

LET TA Network

NCETM Maths Hub

Lingfield Education Trust

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