

Calculation Policy

‘The answer is just the beginning’

September 23



Our Vision

Pearl Hyde is a community primary school where learning is accessible to all pupils. All teachers at Pearl Hyde ensure that children know that learning is collaborative and there is no limit to what they can achieve. Our goal is for the children to become confident, fluent and agile mathematicians who can expertly explain their mathematical processes through careful reasoning.

Underpinning our Maths teaching, is the belief that all children need a deep, long-term, secure and adaptable understanding of the mathematics they are learning. This is what we mean by Mastery. We want our children to develop a solid, conceptual understanding of number and the ability to recall and apply Mathematical knowledge rapidly and accurately.

In line with the National Curriculum Objectives for Maths, our intent is that all children:

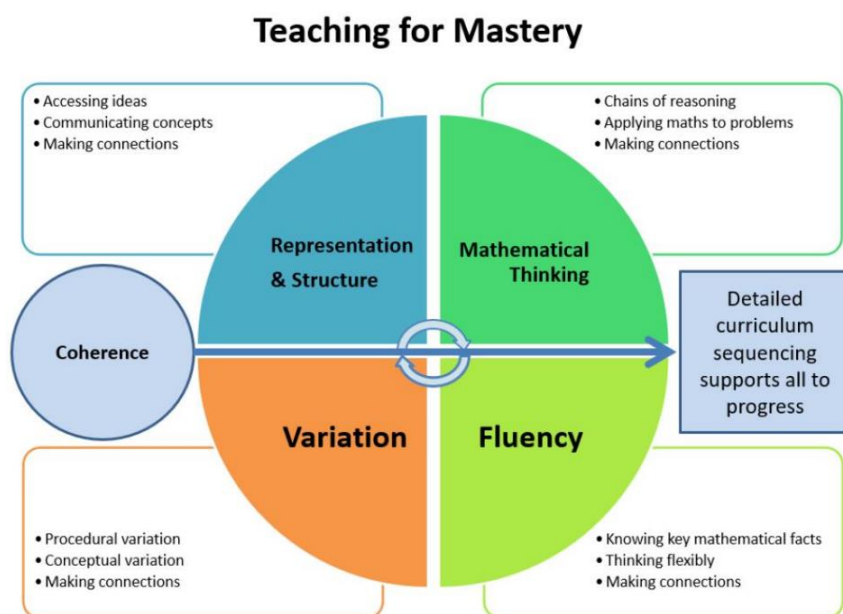
- become **fluent** in the fundamentals of Mathematics through **varied and frequent** practice with increasingly complex problems over time, so that children **develop conceptual understanding** and the ability to **recall and apply** knowledge **rapidly and accurately**
- **reason Mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using **Mathematical language**
- can **solve problems** by **applying** their Mathematics to a variety of **routine and non-routine problems** with increasing sophistication, including breaking down problems into a series of simpler steps and **persevering** in seeking solutions

Implementation of our Maths Curriculum

Our Maths curriculum carefully sequences knowledge, concepts and procedures to build Mathematical knowledge and skills systematically over time. At Pearl Hyde, children study Mathematics daily following the White Rose Maths (WRM) Scheme of Learning, supplemented by a range of high-quality resources to keep Maths lessons engaging and enjoyable. WRM is a blocked scheme, which allows for depth and breadth of learning within each strand of Mathematics.

The mastery approach ensures that children have a complete understanding of the maths curriculum by enabling children to learn and know their fundamental mathematical facts and how to apply them in multiple ways. This may be through more in depth and complex problems; cross-curricular learning or by using different models and methods to answer questions in a variety of ways. Children in all year groups will have access to concrete and pictorial resources to help when working with the abstract context.

All lessons are underpinned by the five big ideas in teaching for mastery:



- **Coherence** – The curriculum is designed to ensure a coherent learning progression throughout the curriculum to provide all pupils access to opportunities to make deep, connected links across different areas of mathematics that they can apply in a range of contexts.
- **Representation and Structure:** Children engage with a wide and varied range of concrete manipulatives, pictorial representations and abstract methodologies within each session. **Cohesive** use of CPA is a fundamental part of mastery in Mathematics for all learners, not just those children with SENd. Concrete and pictorial references

scaffold and strengthen understanding and are widely used as a teaching and learning tool from Foundation Stage to Year 6.



- **Mathematical Thinking** Every learning session includes the opportunity to look for patterns and relationships, construct chains of reasoning using relevant knowledge alongside relevant terminology and solve increasingly complex problems in a systematic and coherent way. All children are given the opportunity to communicate their thinking in all lessons. Sessions include explicit reference to vital **Mathematical vocabulary** and the use of **stem sentences** to support and encourage all children to communicate their ideas with Mathematical precision and clarity.
- **Variation:** Children are exposed to variation in every lesson, either conceptually or procedurally. Conceptual variation involves varying how a concept is represented to draw attention to critical features. Often more than one representation is required to look at the concept from different perspectives and gain comprehensive knowledge. Procedural variation considers how the student will 'proceed' through a learning sequence. Purposeful changes are made in order that pupils' attention is drawn to key features of the mathematics, scaffolding students' thinking to enable them to reason logically and make connections.
- **Fluency:** We are committed to ensuring that children have efficient and accurate recall of key number facts and procedures, as this is essential in reducing cognitive overload when children are thinking deeply about more difficult concepts and problems. Our children engage in regular low stakes testing to earn tables badges and all children have access to Numbots and TimesTables Rock Stars to practice fluent recall.

We believe that the key to success with all learners is quality first teaching. As a school, we use the White Rose Schemes of Learning and follow their Long-Term planning to ensure that teaching is sequenced into small, coherent steps that cover all national curriculum

objectives. Although the mathematic strands are taught in blocks, we ensure that links are made across each area of learning to ensure that children can see and make links throughout the year. We create medium term plans for each block of learning that include high quality resources that teachers can use to create their lessons, key vocabulary that should be used throughout the block of learning and concrete resources that can be used to help children access the key concept of the lesson. Although, we follow the White Rose Scheme of Learning, teachers have the flexibility to spend longer than one lesson on a small step if necessary to meet the needs of the children.

Across all year groups, lessons will follow the mastery structure which contains four parts:

- ‘In focus’ – A task that the children have a go at independently/with a partner first that promotes discussion and allows teachers to identify understanding
- Share – A teacher led discussion, modelling the small step and addressing misconceptions
- Think Together – ‘I do, we do, you do’ part of the lesson – with key questioning as the focus to identify understanding. Teacher modelling first, partner work, independent activity.’
- Challenge – A task to deepen understanding and to apply mathematical in a range of problems.

All areas of the maths lesson allow for high levels of oracy between children and teachers to discuss mathematical concepts and address misconceptions.

Mathematical Fluency

At Pearl Hyde, we understand the importance of children building a solid foundation of number sense to help them develop a range of core skills in maths. In Key Stage 1, we implement the Fluency Bee programme which has been designed by White Rose Maths to give children confidence with numbers through varied and frequent practice, using a small steps approach. It uses a practical approach involving an emphasis on mathematical talk and key representations throughout the programme to help children build visual images.

Children in Key Stage 1 are all exposed to a 15 minute daily lesson of maths fluency to ensure frequent practice of number skills, which is separate from the main lesson. The lessons help to highlight mathematical connections to the children, build their confidence in working with number and their conceptual understanding.

Implementation – Planning

Reception:

At Pearl Hyde we understand the importance of early experiences of Maths, and are committed to the Foundation Stage Framework within our setting. This approach places a significant emphasis on developing a strong grounding in number – understanding that this

is a necessary building block for children to excel in the subject. Following baseline assessments, Maths in the Autumn and Spring Term is planned and delivered with a focus number of the week/s. In readiness for Year 1, the Maths curriculum in the Summer Term follows the White Rose Small Steps for Learning.

Practitioners provide creative and engaging opportunities for children to ignite their curiosity and enthusiasm for the subject. Activities and experiences are frequent and varied, and allow children to build on and apply understanding of Numbers to 10. Concrete manipulatives are a key focus within sessions, as is the use of pictorial representations including Tens Frames and Part/Whole Models.

A daily maths session is planned and delivered, currently alongside a daily 'Mastering Number' session with the aim to secure firm foundations in the development of good number sense for all children from Reception. Over time we want our children at Pearl Hyde to leave KS1 with fluency in calculation and a confidence and flexibility with number. Attention is given to key knowledge and understanding needed in Reception to support success in the future. Provision will be created using high quality resources such as NCETM and White Rose Schemes of Learning.

Years 1 – 6

Lessons are planned directly onto Active Primary flipcharts which are saved together with other resources centrally. This allows for the Maths Lead and SLT to monitor the planning of Maths easily when reviewing the quality of teaching and learning during the school year. For a consistent approach, maths lessons across the school are focused around the concrete, pictorial and abstract pedagogy.

Maths in Reception

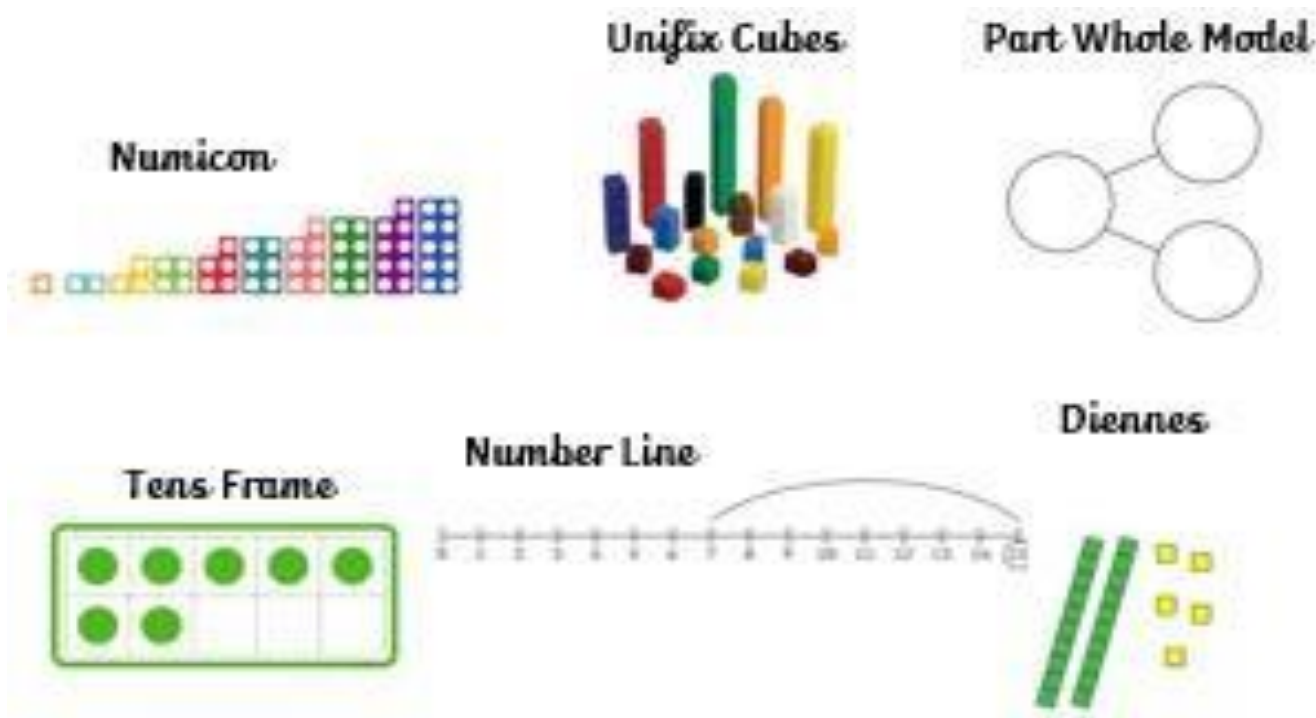
As children begin their school journey, they will focus on becoming familiar with the value of a number and how they can see maths in the world around them. The National Centre for Excellence in the Teaching of Mathematics has identified six main areas that collectively underpin children's early mathematical learning. These six areas provide the firm foundations for the maths that children will encounter as they go up the years in primary school.

The six main areas are:

- Cardinality and Counting
- Comparison
- Composition
- Pattern
- Shape and Space
- Measures

During Reception, children will be taught Maths through a variety of teacher and child-led activities and be exposed to all areas of Maths throughout the learning environment. Number Blocks will be used to specifically support the teaching and learning of Cardinality and Counting. Children will also be introduced to mathematic models that will support their learning throughout their Maths journey at Pearl Hyde.

These include:



The main teaching activity will be whole-class based with everyone covering the same content. Children are taught in classes, not set groups in line with the mastery approach. Lessons are structured around the CPA approach providing opportunities throughout for using mathematical vocabulary, developing mathematical thinking and using multiple representations. In lessons where recording is required children are encouraged to record their answers in different ways. The types of questioning used throughout the lessons allow for assessment opportunities throughout. This provides opportunities to evaluate what has been learnt, review success and address misconceptions.

There are no specific time limits for the different parts of a lesson. The aim of a mathematics lesson is to teach a child a skill or strategy that will provide a solution to a task. It is not simply to produce a page of correct number work, which is abstract to any real-life situation. Although Maths is taught as a discrete subject, teachers are encouraged to exploit any cross-curricular links and provide opportunities for children to demonstrate their mastery of concepts or skills in other subjects (eg: science, ICT, PE, topic).

It is the responsibility of teaching assistants supporting individuals or groups of children within a maths lesson to ensure they have seen the flipchart and discussed it with the class teacher and prepared any required resources. They are expected to provide feedback to the teacher on a daily basis for the children they have been working with. This feedback may be verbal or if preferred, written on 'post-it' notes. Learning in books is presented and marked in accordance with guidance in the marking policy.

The classroom environment should be mathematically rich and support current learning. Maths working walls will be built throughout a unit and used daily as a part of the maths lesson. They must be clearly visible. Key vocabulary, reference to the models and images that the children have been working with during the lesson and/or unit, links and sentence stems should all be included.

Number Bonds and Multiplication Tables

In Key Stage 1, children have 2 fluency sessions a week where teachers will focus on teaching key skills such as number bonds, times tables and mental strategies for addition calculations such as adding 9 and near doubles. Each week the teacher will choose a different focus for the children to practise. This may be learning a new key skill or practising one they have learnt previously.

From Year 1 to Year 6, teachers will be testing the children on specific key skills each week, this will either be number bond facts or a times table, to enable children to achieve mastery in these areas. Every child will know which key skill is their focus of learning to allow them to have ownership of this. When a child achieves mastery in their key skill, they will receive a badge or sticker. These badges are for the children to keep and wear on their school uniform with pride. Below is a table that shows which year groups will learn which key skills.

Year Group	Teaching and Learning	Focus for checking and practice
Reception	Number bonds to 5 Number Bonds to 10	Counting in 1s
Year 1	Number bonds to 20	Number bonds to 5 Number bounds to 10
Year 2	Number bonds to 50 Number bonds to 100 2,5 and 10 times tables	Number bonds to 20
Year 3	3,4 and 8 times tables	2,5 and 10 times tables
Year 4	6,7, 9, 11 and 12 times tables	3,4 and 8 times tables
Year 5	All times tables to 12 x 12 checked, practised thoroughly and applied	
Year 6		

Homework

Maths homework is provided for all children weekly. Children will be asked to complete one piece of Maths homework either from a CPG book in Reception and Key Stage 1 or on Century Tech in Key Stage 2; this will provide children with opportunities to practise skills they have been taught either in previous years or during their current maths lessons.

Teachers will expect children to be practising fundamental mathematical skills at home regularly. These skills include times tables, number bonds, halving and doubling. We therefore encourage the children to practice such skills daily at home; this could be completed using 'BBC Supermovers', 'Numbots', 'TTRockstars' or Pinpoint Maths Check.

Year Group	Homework Expectation
Reception	One page from CPG Targeted Questions Reception book weekly
Year 1	One page from CPG Targeted Questions Year 1 book weekly. Learning Number bonds to 5, 10 and 20 in preparation for weekly number fluency tests using Numbots
Year 2	One page from CPG Targeted Questions Year 2 book weekly. Learning Number bonds to 50 and 100 in preparation for weekly number fluency tests using Numbots. This will progress to learning 2, 5 and 10 multiplication and division facts in preparation for weekly number fluency tests using TTRockstars and PinPoint.
Year 3	One nugget set on Century Tech weekly. Learning 3,4 and 8 multiplication and division facts in preparation for weekly number fluency tests using TTRockstars and PinPoint.
Year 4	One nugget set on Century Tech weekly. Learning 6,7,9,11 and 12 multiplication and division facts in preparation for weekly number fluency tests using TTRockstars and PinPoint.
Year 5	One nugget set on Century Tech weekly. Weekly practise on TTRockstars and PinPoint to continue to embed their multiplication and division facts.
Year 6	One nugget set on Century Tech weekly. Weekly practise on TTRockstars and PinPoint to continue to embed their multiplication and division facts.

Growth Mindset

Throughout all the Maths lessons at Pearl Hyde, the children are encouraged to have a growth mindset. By teaching children that they can learn, change and develop the skills that they need to overcome a challenge and are better equipped to handle setbacks. The features of a growth mindset for Maths are:

- Believing you can learn mathematics to the highest levels
- Understanding that mistakes are valuable
- Knowing that asking and answering questions is important
- Understanding that mathematics is about creativity, pattern spotting and sense making
- Knowing that communication and making connections are vital components of mathematics
- Knowing that in a mathematics classroom the focus is not on performing or giving quick answers
- Understanding that a depth of knowledge is more important than speed



Long Term Planning Examples



EYFS

Summer	Spring	Autumn	EYFS
Numbers beyond 10	Number 6	Baseline	Week 1
			Week 2
Number Stories Addition & Subtraction	Number 7		Week 3
			Week 4
Doubling and Halving	Number 8		Week 5
Half Term	Number 9	Number 1	Week 6
Sharing	Half Term	Number 2	Week 7
Odd & Even Numbers	Time	Half Term	Week 8
Patterns & Relationships Spatial Reasoning	Number 10	Number 3	Week 9
			Week 10
		Consolidation	3D Shape
Measures	Number 5		
		Summer	Easter
Xmas	Week 14		
			Week 16

Year 1

Summer	Spring	Autumn	Year 1	
Measurement: Mass & Volume	Number: Place Value (Within 20)	Baseline	Week 1	
		Number: Place Value (Within 10)	Week 2	
	Week 3			
Week 4				
Week 5				
Week 6				
Number: Multiplication & Division	Number: Addition & Subtraction (Within 20)	Assessment	Week 7	
Fractions			Week 8	
Half Term	Half Term	Half Term	Week 9	
Fractions	Number: Place Value (Within 50)	Number: Addition & Subtraction (Within 10)	Week 10	
Geometry: P and D			Week 11	
Number: Place Value (Within 100)	Measurement: Length & Height		Week 12	
Measurement: Money	Assessment		Week 13	
Measurement: Time			Geometry: Shape	Week 14
			Assessment	Week 15

Year 2

Summer	Spring	Autumn	Year 2
Number: Fractions	Measurements: Money	Baseline	Week 1
		Number: Place Value	Week 2
Week 3			
Week 4			
Week 5			
Week 6			
Measurement: Time	Number: Multiplication and Division	Number: Addition & Subtraction	Week 7
Half Term		Assessment	Week 8
		Half Term	Half Term
Statistics	Measurement: Length and height	Number: Addition & Subtraction	Week 10
Geometry: P and D	Measurement: Mass, capacity and temperature		Week 11
			Week 12
Consolidation		Geometry: Shape	Week 13
			Week 14
			Week 15

Year 3

Summer	Spring	Autumn	Year 3
Number: Fractions, B	Number: Multiplication, and Division, B	Baseline	Week 1
		Number: Place Value	Week 2
Measurement: Money	Measurement: Length and perimeter		Week 3
		Week 4	
Measurement: Time	Measurement: Length and perimeter	Number: Addition & Subtraction	Week 5
			Week 6
Half Term	Fractions A	Assessment	Week 7
Measurement: Time	Half Term	Half Term	Week 8
Geometry: Shapes	Fractions A	Number: Addition & Subtraction	Week 9
			Week 10
Statistics	Measurement: Mass and capacity	Number: Multiplication and Division A	Week 11
			Week 12
Consolidation	Assessment	Number: Multiplication and Division A	Week 13
			Week 14
			Week 15

Year 4

Summer	Spring	Autumn	Year 4
Number: Decimals B	Number: Multiplication, and Division B	Baseline	Week 1
		Number: Place Value	Week 2
Week 3			
Week 4			
Week 5			
Week 6			
Measurement: Money	Measurements: Length and perimeter	Number: Addition & Subtraction	Week 7
Measurement: Time		Number: Fractions	Week 8
Half Term	Half Term	Half Term	Week 9
Geometry: Shapes	Number: Fractions	Number: Addition & Subtraction	Week 10
			Week 11
Statistics	Number: Decimals A	Measurement: Area	Week 12
Geometry: P and D		Assessment	Number: Multiplication, and Division A
	Week 14		
Consolidation		Assessment	Week 15

Year 5

Summer	Spring	Autumn	Year 5
Geometry: Shape	Number: Multiplication and Division: B	Baseline	Week 1
		Number: Place Value	Week 2
Week 3			
Week 4			
Geometry: P and D	Number: Fractions: B	Number: Addition & Subtraction	Week 5
			Week 6
Assessment	Number: Decimals and Percentages	Assessment	Week 7
Half Term		Half Term	Week 8
Decimals	Number: Decimals and Fractions: A	Number: Multiplication and Division: A	Week 9
			Week 10
	Week 11		
Number: Negative Numbers	Measurement: Perimeter and Area	Number: Fractions: A	Week 12
Measurement: Converting Units	Statistics		Week 13
			Week 14
Measurement: Volume	Assessment		Week 15

Year 6

Summer	Spring	Autumn	Year 6
Geometry: Shapes	Number: Ratio	Baseline	Week 1
		Number: Algebra	Number: Place Value
Week 3			
Number: Addition, Subtraction, multiplication and division.	Geometry: P and D		Week 4
	SATS	Week 5	
		Week 6	
	Half Term	Number: Decimals	Week 7
Number: Fractions, Decimals and Percentages		Week 8	
Four challenge: Transition units for Year 7	Half Term	Half Term	Week 9
	Number: Fractions, Decimals and Percentages	Number: Fractions: A	Week 10
	Measurement: Area, Perimeter and Volume	Number: Fractions: B	Week 11
	Statistics	Measurement: Converting Units	Week 12
	Assessment	Assessment	Week 13
		Assessment	Week 14
		Do-y-Mach	Week 15



Medium Term Planning Example



Medium Term Plan – Example



Autumn 1

Maths Medium Term Plan

Strand – Place Value (Within 10) – 5 weeks	National curriculum objectives <ul style="list-style-type: none"> count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens given a number, identify one more and one less identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least read and write numbers from 1 to 20 in numerals and words
Small Steps of Learning Step 1: Sort objects Step 2: Count objects Step 3: Count objects from a larger group Step 4: Represent objects Step 5: Recognise numbers as words Step 6: Count on from any number Step 7: 1 more Step 8: Count backwards within 10 Step 9: 1 less Step 10: Compare groups by matching Step 11: Fewer, more, same Step 12: Less than, greater than, equal to Step 13: Compare numbers Step 14: Order objects and numbers Step 15: The number line	Vocabulary Sort, groups, digit, count back, fewer, one more than, one less than, matched, less than, (<), greater than (>), equal to (=), most, least, fewest, greatest, number line, number track, pattern Teaching Resources Anchor Tasks and Guided Practice Maths No Problem – Numbers to 10 pages 2-24 White Rose Place Value Block Extra Guided Practice Power Maths – Numbers to 1-10 pages 6-57 Maths Shed – Stage 1, Autumn Term, Block 1 – Place Value (Within 10) NCETM Spine Documents 1.3 & 1.4 Challenge Questions White Rose Place Value Block I-See Reasoning Page 4-27 NCETM Mastery Year 1 assessments Page 9-12 NRICH- https://docs.google.com/spreadsheets/d/1kYwPUMPxu53c26sKywCk3tYYA74kgdrABjAWnFyUfM/edit#gid=930038117
Stem Sentences One, two.....There are _____ objects The five represents all the counters The _____ represents the red counters The _____ represents the yellow counters	

The known part is _____
 The missing part is _____
 The whole is _____ and one part is _____ so the other part must be _____
 The number before a given number is one less; the number after a given number is one more
 There are _____ objects. _____ is the whole.
 One, two, three.....There are _____ objects
 _____ is five and _____ more
 _____ is the whole; _____ is a part; _____ is a part
 Five sits in the _____ of zero and ten
 Eight is _____ to ten than to zero
 Two is _____ to zero than to ten
 _____ is made of (a) pair(s); it is an even number
 _____ is not made of pairs; it is an odd number
 Numbers that can be made out of groups of two are even numbers
 Numbers that can be made out of groups of two are odd numbers
 Even numbers can be partitioned into two odd parts or two even parts
 Odd numbers can be partitioned into one odd part and one even part
 If the whole is odd and one part is even, the other part must be odd.
 If the whole is odd and one part is odd, the other part must be even
 If the whole is even and one part is even the other part must be even
 If the whole is even and one part is odd the other part must be odd

Models and Images



Addition & Subtraction

Routeway



Key Stage 1

Year 1

During Year 1, children will continue using informal methods shown to them in Reception when approaching the mathematical challenges presented to them. The methods that they use throughout Year 1 are developed and will be used by the children throughout their school journey. In Year 1, all children will be given the opportunity to use the following models and equipment to help with their progression towards written calculations.

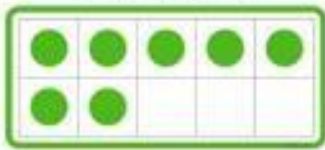
Numicon



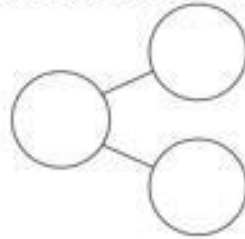
Unifix Cubes



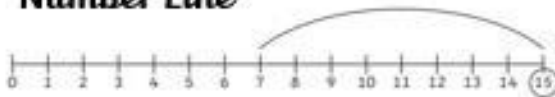
Tens Frame



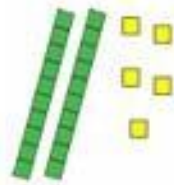
Part Whole Model



Number Line



Diennes



Year 2

In Year 2, children will continue to build upon and be introduced to more informal methods they can use to calculate. As children progress throughout the year, all children will be shown a formal written method for addition and subtraction. Children will have the opportunity to use this method once they are secure in their knowledge of place value. This will be determined by each individual class teacher. The following models will be shown and used by the children throughout Year 2.

Straws



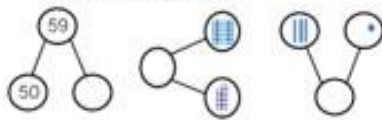
100 Square

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

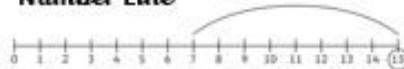
Tens and Ones Chart

Tens	Ones
	1*

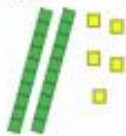
Part Whole Model



Number Line



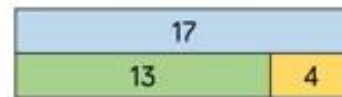
Diennes



Place Value Counters



Bar Model



Formal Methods		
NO EXCHANGES		
$\begin{array}{r} 25 \\ + 3 \\ \hline 28 \end{array}$	$\begin{array}{r} 23 \\ + 40 \\ \hline 63 \end{array}$	$\begin{array}{r} 22 \\ + 17 \\ \hline 39 \end{array}$
$\begin{array}{r} 37 \\ - 2 \\ \hline 35 \end{array}$	$\begin{array}{r} 36 \\ - 20 \\ \hline 16 \end{array}$	$\begin{array}{r} 37 \\ - 24 \\ \hline 13 \end{array}$
EXCHANGES		
$\begin{array}{r} 15 \\ + 18 \\ \hline 13 \\ + 20 \\ \hline 33 \end{array}$	$\begin{array}{r} 1\cancel{2}13 \\ - 5 \\ \hline 18 \end{array}$	$\begin{array}{r} 2\cancel{3}12 \\ - 16 \\ \hline 16 \end{array}$
<i>Expanded</i>		
<i>With practical equipment and drawing for support</i>		

Key Stage 2 Year 3

As children enter Year 3, they will continue to use the informal methods already taught to them; these methods will help to support the children as they progress through to using formal written calculations. Children will be shown and use the expanded calculation methods to ensure their place value is secure. All children will then be shown and use the compact method for addition and subtraction. All the methods that the children are shown can be used to support the children with their reasoning and problem solving.

NO EXCHANGES		Formal Methods	
$\begin{array}{r} 213 \\ + 40 \\ \hline 253 \end{array}$	$\begin{array}{r} 213 \\ + 74 \\ \hline 287 \end{array}$	$\begin{array}{r} 560 \\ + 234 \\ \hline 794 \end{array}$	
$\begin{array}{r} 243 \\ - 40 \\ \hline 203 \end{array}$	$\begin{array}{r} 658 \\ - 42 \\ \hline 616 \end{array}$	$\begin{array}{r} 794 \\ - 132 \\ \hline 662 \end{array}$	
1 EXCHANGE			
<i>Expanded - progress to compact if appropriate</i>			
$\begin{array}{r} 176 \\ + 40 \\ \hline 216 \end{array}$	$\begin{array}{r} 176 \\ + 40 \\ \hline 216 \\ 1 \end{array}$	$\begin{array}{r} 435 \\ + 217 \\ \hline 652 \end{array}$	$\begin{array}{r} 435 \\ + 217 \\ \hline 652 \\ 1 \end{array}$
$\begin{array}{r} 110 \\ + 100 \\ \hline 210 \end{array}$		$\begin{array}{r} 400 \\ + 600 \\ \hline 1000 \end{array}$	
$\begin{array}{r} 600 + 40 + 13 \\ - 20 + 8 \\ \hline 600 + 20 + 5 = 625 \end{array}$		$\begin{array}{r} 643 \\ - 28 \\ \hline 615 \end{array}$	
$\begin{array}{r} 300 + 30 + 17 \\ - 100 + 20 + 8 \\ \hline 200 + 10 + 9 = 219 \end{array}$		$\begin{array}{r} 347 \\ - 128 \\ \hline 219 \end{array}$	

Year 3 – Continued...

Formal Methods Continued....

MORE THAN 1 EXCHANGE

Expanded - progress to compact if appropriate

$$\begin{array}{r} 679 \\ + 73 \\ \hline 112 \\ 140 \\ + 600 \\ \hline 752 \end{array}$$

$$\begin{array}{r} 679 \\ + 73 \\ \hline 752 \\ 11 \\ \hline \end{array}$$

$$\begin{array}{r} 435 \\ + 287 \\ \hline 112 \\ 110 \\ + 600 \\ \hline 722 \end{array}$$

$$\begin{array}{r} 435 \\ + 287 \\ \hline 722 \\ 11 \\ \hline \end{array}$$

$$\begin{array}{r} 300 \\ \cancel{400} \\ - \\ \hline 300 \end{array} + \begin{array}{r} 160 \\ \cancel{70} \\ - 80 \\ \hline 80 \end{array} + \begin{array}{r} 14 \\ \cancel{4} \\ + 5 \\ \hline 9 \end{array} = 389$$

$$\begin{array}{r} 3 \quad 16 \quad 14 \\ \cancel{4} \quad \cancel{7} \quad 4 \\ - 85 \\ \hline 389 \end{array}$$

$$\begin{array}{r} 500 \\ \cancel{600} \\ - 200 \\ \hline 300 \end{array} + \begin{array}{r} 120 \\ \cancel{20} \\ + 70 \\ \hline 90 \end{array} + \begin{array}{r} 15 \\ \cancel{5} \\ + 8 \\ \hline 23 \end{array} = 457$$

$$\begin{array}{r} 5 \quad 12 \quad 1 \\ \cancel{6} \quad \cancel{3} \quad 5 \\ - 278 \\ \hline 457 \end{array}$$

Subtraction - including 0

$$\begin{array}{r} 500 \\ \cancel{600} \\ - 200 \\ \hline 300 \end{array} + \begin{array}{r} 90 \\ \cancel{100} \\ + 40 \\ \hline 130 \end{array} + \begin{array}{r} 13 \\ \cancel{3} \\ + 7 \\ \hline 20 \end{array} = 457$$

$$\begin{array}{r} 5 \quad 9 \\ \cancel{6} \quad \cancel{10} \quad 3 \\ - 247 \\ \hline 356 \end{array}$$

Children will begin Year 4 continuing to use the expanded method for addition and subtraction; however, this may only be for a short time. By the end of Year 4, children should be secure in the compact method for both addition and subtraction including when exchanges are being used. Children will still have access to informal methods of calculation to support them when they are reasoning and problem solving.

NO EXCHANGES		Formal Methods			
3 2 5 1	5 8 3 7				
+ 5 4 1 3	- 1 3 2 4				
8 6 6 4	4 5 1 3				
1 EXCHANGE					
3 5 1	3 2 5 1	1 ⁴ 5 ¹ 3 4		4 ⁶ 7 ¹ 6 7	
2 3 4	+ 5 4 7 3	- 2 5 4		- 2 3 9 2	
+ 4 2 3	8 7 2 4	1 2 8 0		2 3 7 5	
1 0 0 8	1	1		1	
1	1				
MORE THAN ONE EXCHANGE					
3 5 5	3 7 5 8	2 9 3 8		8 9 5 8	
2 3 4	+ 4 1 3	+ 5 4 7 3		+ 5 8 7 3	
+ 4 7 3	4 1 7 1	8 4 1 1		1 4 8 3 1	
1 0 6 2	1 1	1 1 1		1 1 1	
1 1	1 1				
2 ³ 1 ⁴ 5	6 ⁷ 5 ⁴ 3	5 ¹² 3 ¹¹ 2			
- 5 3 6	- 3 7 2 8	- 1 5 3 6			
2 6 1 9	3 8 2 5	4 7 8 9			
<i>Including 0</i>					
5 ⁹ 1 ¹ 4 3					
- 4 7 8 1					
1 2 6 2					

Year 5

Throughout Year 5, children will focus more on formal written methods of addition and subtraction when they are calculating. Their learning will still be supported through the use of concrete and pictorial objects as well as the informal methods that they have been taught throughout previous year groups. These informal methods will be used to support children when they are working with a context.

Various Exchanges	Formal Methods	
$\begin{array}{r} 2318 \\ 925 \\ + \quad 53 \\ \hline 3296 \\ \hline 11 \end{array}$	$\begin{array}{r} 32461 \\ + 4352 \\ \hline 36813 \\ \hline 1 \end{array}$	$\begin{array}{r} 37234 \\ + 75479 \\ \hline 112713 \\ \hline 111 \end{array}$
$\begin{array}{r} 560.83 \\ 23.14 \\ + 46.71 \\ \hline 630.68 \\ \hline 111 \end{array}$	$\begin{array}{r} 7^4 \cancel{5}^1 3^5 \cancel{6}^1 \\ - \quad 627 \\ \hline 74739 \end{array}$	$\begin{array}{r} 1^1 \cancel{2}^1 0^3 \cancel{4}^1 39 \\ - \quad 5247 \\ \hline 15192 \end{array}$
	$\begin{array}{r} 7^4 \cancel{8}^1 3^5 \cancel{6}^1 \\ - 32539 \\ \hline 42826 \end{array}$	

Year 6

By Year 6, children should be secure in their formal written method of calculation for addition and subtraction. Equipment will continue to be made available to children to support them in their understanding of mathematical concepts. Children will still be encouraged to use informal written methods to help them solve problems in a context.

Various Exchanges		Formal Methods	
$\begin{array}{r} 76259 \\ 68068 \\ + 7514 \\ \hline 151841 \\ \hline 2 \quad 1 \quad 2 \end{array}$	$\begin{array}{r} 67832 \\ + 5258 \\ \hline 73090 \\ \hline 1 \quad 1 \quad 1 \end{array}$	$\begin{array}{r} 34621 \\ + 35734 \\ \hline 60355 \\ \hline 1 \quad 1 \end{array}$	
$\begin{array}{r} 387.300 \\ 43.190 \\ + 5.234 \\ \hline 435.724 \\ \hline 1 \quad 1 \quad 1 \end{array}$	$\begin{array}{r} \overset{3}{4}7\overset{5}{6}\overset{1}{1}\overset{2}{3}25 \\ - 938052 \\ \hline 3823273 \end{array}$		
$\begin{array}{r} 7813491 \\ \overset{14}{8}3\overset{14}{4}\overset{9}{5}\overset{1}{0}1 \\ - 193642 \\ \hline 640858 \end{array}$	$\begin{array}{r} 216141 \\ \overset{2}{3}2\overset{1}{7}\overset{6}{.}\overset{14}{5}0 \\ - 62.63 \\ \hline 264.87 \end{array}$	$\begin{array}{r} 5141 \\ \overset{5}{6}4\overset{1}{4}\overset{1}{.}27 \\ - 351.80 \\ \hline 293.47 \end{array}$	



Multiplication & Division

Routeway



Key Stage 1

Year 1

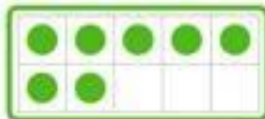
During Year 1, children will continue using informal methods shown to them in Reception when approaching the mathematical challenges presented to them. The methods that they use throughout Year 1 are developed and will be used by the children throughout their school journey. In Year 1, all children will begin to understand multiplication and division through grouping and sharing small quantities, doubling numbers and quantities; finding simple fractions and count in twos, fives and tens.



100 Square

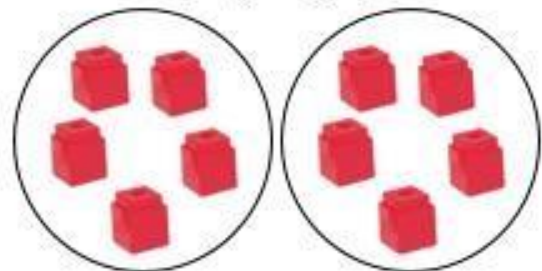
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Tens Frame

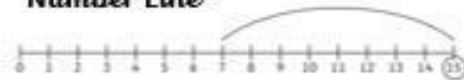


Sharing

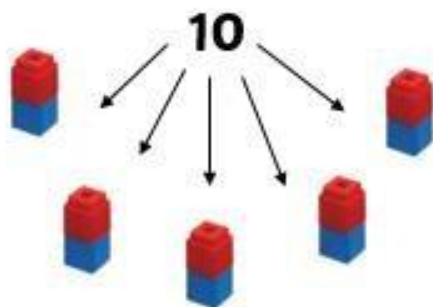
I have 10 cubes. Can you share them equally in 2 groups?



Number Line



Grouping



Year 2

In Year 2 children will be introduced to the multiplication and division symbol; however, they will still not use a formal written method to calculate answers to multiplication and division questions. They will continue to group and share equal groups and begin to work with unequal groups too. Children will continue to learn multiplication and division facts for their twos, fives and tens times table. These concepts will continue to be by the use of concrete materials.

Straws



100 Square

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

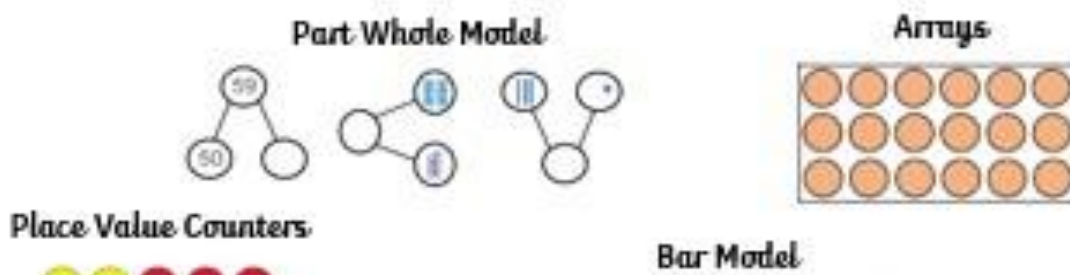
Numicon



Key Stage 2 Year 3

During Year 3, children will be introduced to the first formal written methods that they will use. These formal methods will still be supported by the use of concrete materials to help the children to solve the calculations given to them. Children will also use these methods when solving problems in simple contexts.

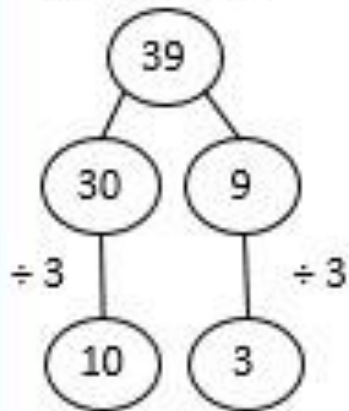
Updated Se



Year 3 – Continued...

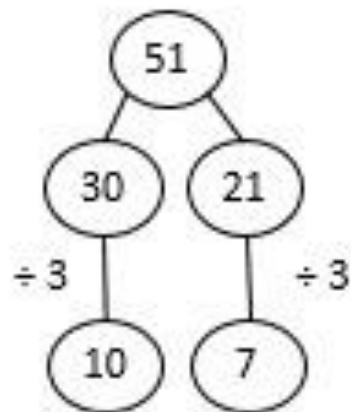
DIVISION

PARTITIONING



$$10 + 3 = 13$$

PARTITIONING USING MULTIPLES



$$10 + 7 = 17$$

NO EXCHANGES

$$\begin{array}{r} 13 \\ 3 \overline{) 39} \end{array}$$

Year 4

As children enter Year 4, they will continue to practise both compact multiplication and division. Children will also continue to use concrete and pictorial materials to support

informal methods when solving problems in context. All children will continue to be shown the compact method however, teachers will use their own judgement if they feel children need more time on the expanded method.

MULTIPLICATION	Formal Methods - 2 digits by 1 digit and 3 digits by 1 digit
NO EXCHANGES	
$\begin{array}{r} 42 \\ \times 3 \\ \hline 126 \end{array}$	$\begin{array}{r} 112 \\ \times 4 \\ \hline 448 \end{array}$
1 EXCHANGE	
$\begin{array}{r} 36 \\ \times 4 \\ \hline 144 \\ 2 \end{array}$	$\begin{array}{r} 312 \\ \times 6 \\ \hline 1872 \\ 1 \end{array}$
2 EXCHANGES	
$\begin{array}{r} 273 \\ \times 7 \\ \hline 1911 \\ 52 \end{array}$	

Year 4 – Continued...

Updated

DIVISION	SHORT DIVISION
NO EXCHANGES	

Year 5

Throughout Year 5, children will continue to become secure in short multiplication. The children will continue to practice short division and be introduced to long multiplication and

division during the year, Children will still be able to use informal methods to help solve problems in context.

SHORT MULTIPLICATION	Formal Methods	
$\begin{array}{r} 2513 \\ \times \quad 7 \\ \hline 17591 \\ 3 \quad 2 \end{array}$	$\begin{array}{r} 6579 \\ \times \quad 8 \\ \hline 52632 \\ 467 \end{array}$	
LONG MULTIPLICATION		
$\begin{array}{r} 27 \\ \times 34 \\ \hline 108 \\ 2 \\ + 810 \\ 2 \\ \hline 910 \end{array}$	$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 12 \\ + 2480 \\ \hline 3224 \\ 11 \end{array}$	$\begin{array}{r} 2374 \\ \times 32 \\ \hline 4748 \\ 1 \\ + 70220 \\ \hline 121 \\ \hline 74968 \end{array}$

Year 5 – Continued...

Up

SHORT DIVISION			
34	241	1345	46 r7

Year 6

In Year 6, children will continue to practise all methods taught in previous years; they will continue to practise long division and learn how to multiply and divide decimals.

Updated September 2023

LONG MULTIPLICATION

$$\begin{array}{r}
 6027 \\
 \times \quad 34 \\
 \hline
 24108 \\
 12 \\
 + 180810 \\
 2 \\
 \hline
 204918
 \end{array}$$

Formal Methods**MULTIPLYING DECIMALS**

$ \begin{array}{r} 8.7 \\ \times \quad 6 \\ \hline 52.2 \\ 4 \end{array} $	$ \begin{array}{r} 8.68 \\ \times \quad 7 \\ \hline 60.76 \\ 45 \end{array} $	$ \begin{array}{r} 784.9 \\ \times \quad 6 \\ \hline 4909.4 \\ 525 \end{array} $
$ \begin{array}{r} 41.68 \\ \times \quad 7 \\ \hline 291.76 \\ 145 \end{array} $	$ \begin{array}{r} 47.2 \\ \times \quad 62 \\ \hline 94.6 \\ 1 \end{array} $	$ \begin{array}{r} 31.56 \\ \times \quad 32 \\ \hline 94.68 \\ 11 \end{array} $
<p style="text-align: center;">1</p>	$ \begin{array}{r} + 2838.0 \\ 41 \\ \hline 2932.6 \\ 11 \end{array} $	$ \begin{array}{r} + 631.20 \\ 11 \\ \hline 725.88 \\ 1 \end{array} $

Year 6 – Continued...**LONG DIVISION**

$$\begin{array}{r}
 132 \\
 26 \overline{) 271432} \\
 \underline{- 26}
 \end{array}$$

