Church Hill C of E Junior School

Mathematics Policy 2020

'Let your light shine!'

*"In the same way, **let your light shine** before men, that they may see your good deeds and glorify your Father in heaven." Matthew 5 v.16*

Introduction

At Church Hill, it is our passion that every child reaches their potential in order to let their light shine.

Mathematics is both a *key* skill within school, and a *life skill* to be utilised throughout every person's day-to-day experiences.

This policy reads in conjunction with the National Curriculum (2014) and the following school policies:

- Calculation Policy
- Assessment Policy
- Marking Policy (with some subtle differences – see below)
- Special Educational Needs Policy

Rationale

Mathematics equips pupils with the uniquely powerful set of tools to understand and change the world. These tools include logical reasoning, problem solving skills and the ability to think in abstract ways. Mathematics is important in everyday life. It is integral to all aspects of life and - with this in mind - we endeavour to ensure that children develop a positive and enthusiastic attitude towards mathematics that will stay with them.

The National Curriculum for mathematics (2014) describes in detail what pupils must learn in each year group. Combined with our calculation policy *(see appendix 1),* and White Rose Scheme of Learning *(see appendix 2),* this ensures continuity, progression and high expectations for attainment in mathematics.

It is vital that a positive attitude towards mathematics is encouraged amongst all of our pupils in order to foster confidence and achievement in a skill that is essential in our society. At Church Hill we use the National Curriculum for Mathematics (2014) as the basis of our mathematics programme. We are committed to ensuring that all pupils achieve mastery in the key concepts of mathematics, appropriate for their age group, in order that they make genuine progress and avoid gaps in their understanding that provide barriers to learning as they move through education. Assessment for Learning,

an emphasis on investigation, problem solving, fluency and reasoning, the development of mathematical thinking and development of teacher subject knowledge are therefore essential components of the Church Hill approach to this subject.

Aims

Through mathematics in our school we aim to develop:

- a fascination and enjoyment of mathematics as a subject in which all children can achieve, progress and be successful;
- the children's abilities to use and apply mathematics effectively in everyday situations, using specific mathematical vocabulary;
- an ability for children to communicate their ideas both orally and in written form;
- independent, as well as co-operative, ways of working, encouraging children to explore ideas and activities in a variety of group settings;
- the children's ability to recall number facts quickly and accurately and use appropriate mental and/or written calculation strategies;
- the confidence of our pupils and their ability to apply their mathematical knowledge and skills in a variety of challenging real life situations;
- children's logical thinking, reasoning and ability to problem solve as transferable life skills;
- the children's awareness of mathematics as a powerful tool that has applications both inside and outside of the classroom;
- the children's awareness of the broad cultural background of mathematics.

Principles of Teaching and Learning

The school uses a variety of teaching and learning styles in mathematics lessons during each lesson. At Church Hill, we teach whole class mathematics, with work differentiated 'mild', 'hot' and 'spicy' where appropriate. Pupils are provided with a variety of opportunities to develop and extend their mathematical skills, including group work, paired work, whole class teaching and individual work.

Our teachers strive to:

- build children's confidence and self esteem
- develop children's independence
- allow all children to experience regular success
- contextualise mathematics
- use practical approaches to mathematics (models and images)

- encourage children to select independently resources to help them
- challenge children of all abilities.
- encourage children to enjoy mathematics
- develop a child's understanding of mathematical language
- encourage children to learn from teachers, peers and their own mistakes
- allow children to ask questions as well as answer them.

Mathematics contributes to many subjects and it is important the children are given opportunities to apply and use Mathematics in real contexts. E.g. there should be regular, carefully planned opportunities for measuring in Science, for the consideration of properties of shape and geometric patterns in Technology and Art, and for the collection and presentation of data in History and Geography. We endeavour at all times to set work that is challenging, motivating and encourages the pupils to think about how they learn and to talk about what they have been learning.

Additional enrichment opportunities are provided for pupils to further develop mathematical thinking during our annual Maths Day.

Lessons

The school is committed to teaching high quality maths lessons in line with the 'mastery' approach as we believe that children's chances of success are maximised if they develop a deep and lasting understanding of mathematical procedures and concepts which is both secure and adaptable. Children are encouraged to use the bar model for problem solving and look for different ways to solve the same problem, thinking about which method was best and why, paying particular attention to relationships between number (i.e. conceptual & procedural variation). Our sequence lessons are designed to follow the 2014 national curriculum's programme of study which states:

- *The expectation is that most pupils will move through the programmes of study at broadly the same pace.*
- *Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content.*
- *Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practise, before moving on.*

To provide adequate time for developing mathematics, maths is taught daily and discretely. Each day, the children take part in a 15 minute 'magic maths' session to improve fluency and times tables. This is taught using a variety of games and by using the times table counting stick; one of these lessons a week is the weekly Metacognition Challenge (a recap of something they learned last week, something they learned 2

weeks ago, something they learned last month and something they learned 'a while ago' to help improve their memory and metacognition) and another one the Times Table Challenge. Each day, they also take part in a 60 minute mathematics lesson. One of these a week is a discrete arithmetic lesson and other four focus on reasoning and problem solving.

After that, there is no 'set structure' to the maths lesson. Instead, teachers will be focused on an objective and the best way to achieve and master it and as a school we are working towards developing a 'ping pong' approach within lessons. However, a typical lesson may look like:

Do now → new learning → discuss/apply/investigate → develop learning → independent task → plenary

Children who are low in confidence, often in need of more time to learn new concepts or are identified to be falling behind expectations in pupil progress meetings are part of a pre-teach intervention 3x weekly (or as frequent as time allows due to other subject interventions). Children who have struggled within the lesson are intervened with post-lesson and before the next lesson (see 'marking' for more details).

Although we encourage and celebrate using a wide range of teaching resources, the following are 'non-negotiable' and should be seen across each year group:

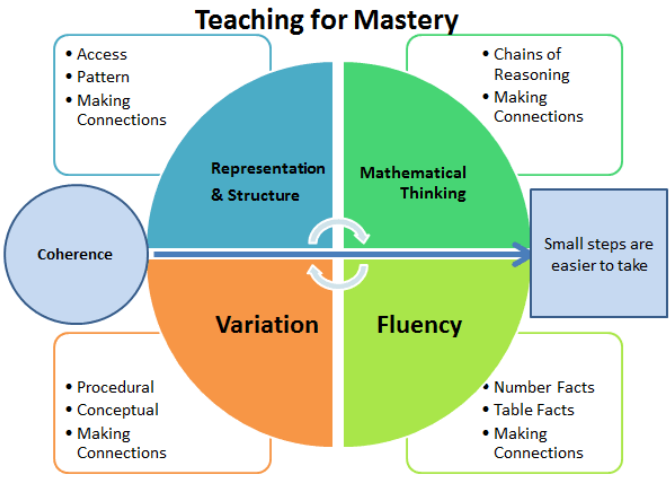
- Mixed ability seating
- White Rose Scheme of Learning to be used as a guide for lesson sequence
- Differentiation (mild, hot and spicy) ***when appropriate***
- Metacognition challenge every Monday
- Times Table challenge each Friday
- Magic maths with variation follow up 3x weekly
- 1 x arithmetic lesson a week
- Pre-teach intervention 3x weekly
- CPA approach across units/lessons
- Commitment towards developing a 'ping pong' approach

Planning

We follow the White Rose Scheme of Learning as a whole school; however, it is to be expected that year groups may be slightly behind/ahead of the sequence on occasion in order to meet the individual needs of their classes/year groups. The arithmetic lesson follows the school's calculation policy. Gap analysis will also be identified after an assessment and teaching adjusted to address these gaps in learning – whether it be via whole class teaching, small group work or 1:1 support. Long term and medium term

planning is expected but there is no expectation for written weekly/daily plans; instead, all lessons, flipcharts and resources for the week ahead are to be reviewed in the year groups weekly planning meeting to ensure consistency and quality.

Each objective should be planned to follow the example of the following model taken from the NCETM:



Resources

Each classroom has a bank of essential resources kept within their classroom. More specialist resources are kept within the maths resource cupboard. The following resources are a great 'go to' list when planning the subject:

Physical resources (amongst others):

- Cuisenaire rods
- Dienes blocks
- Place value counters
- Multi-link cubes
- Bead strings
- Number lines
- 100 squares
- Clocks
- 1-6 dice
- 0-9 dice

Teaching resources:

- Nrich
- Testbase
- Target Your Maths
- Convince me cards
- White Rose
- Active Maths
- MyMaths
- Times Tables Rockstars
- NCETM Teaching for Mastery: Questions, tasks and activities to support assessment document.
- ITPs (Mathsframe website for modern computers) *https://mathsframe.co.uk/en/resources/category/586/ITPs*)

There is an expectation to see these resources evident in planning and lessons

Marking

Marking in maths follows the same coding as the whole school marking policy, but with some subtle differences. We believe in a 'rapid intervention' marking system: where after a lesson, everyone's learning is RAG rated. If they are confident and get a 'G', no further marking is expected other than positive praise where appropriate. Should a child receive a 'R', this should be followed up by a member of staff intervening at the earliest possible opportunity and before the next lesson. This would involve a member of staff going over that day's work either 1:1 or in a small group to address their misconceptions. This would be evidence in their maths book via blue highlighter. If the child is assessed as 'A' the teacher would use their judgement to decide whether or not his intervention is necessary. This approach allows teachers to quickly assess pupils learning after a lesson for rapid intervention to prevent a child from falling behind in their learning. Pupil's self-assessment of their own learning is also encouraged as further formative and summative assessment. For pupils who boarder between WTS and EXS, or are low on confidence/not showing signs of reaching their full potential, pre-teach intervention will be put in place in advance of the lesson to ensure that they have the best possible opportunity to achieve their full potential.

Assessment

At Church Hill we use a range of assessment opportunities through which we ensure that children are making appropriate progress and that the activities they take part in are suitably matched to their ability and level of development.

Formative Assessment (AfL) - (monitoring children's learning):

Assessment is an integral and continuous part of the teaching and learning process at Church Hill and much of it is done informally as part of each teacher's day to day work. Teachers integrate the use of formative assessment strategies such as effective questioning, clear learning objectives, the use of success criteria, effective feedback and response in their teaching and marking and observing children participating in activities. Findings from these types of assessment are used to inform future planning.

Summative Assessment – (evaluating children's learning):

More formal methods are used to determine the progress of children at various times during the school year:

- We use termly assessments as a way of recording children's progress in Maths. This information is then updated onto the test trackers and then used to guide teacher assessments on the TAG in the form of 'on track to be' or 'at' EXS/GDS.
- Statutory End of Key Stage Assessment is also carried out at the end of Key Stage Two.

Computer Technology

ICT is used in various ways to support teaching and motivate children's learning. Each classroom has a laptop connected to an interactive whiteboard (Active Inspire software). All teachers are provided with a laptop to support their planning and provision and are encouraged to use computer technology to enhance teaching and learning in mathematics where appropriate. The school is equipped with a computing suite, 15 laptops and 15 i-pads. The school subscribes to 'MyMaths' to facilitate further practice of key skills online and at home. The school subscribes to 'Testbase' and a number of software products to aid with the planning and delivery of lessons. The school also subscribes to 'Times Tables Rockstars' for use both in and out of school and holds an annual 'Times Tables Rockstars' competition.

Role of the Subject Leader

- Ensures teachers understand the requirements of the National Curriculum and helps them to plan lessons. Leads by example by setting high standards in their own teaching.
- Prepares, organises and leads CPD and joint professional development – especially lesson studies, with the support of the Headteacher.
- Works with the SENCO and Assessment Co-ordinator.

- Observes colleagues from time to time with a view to identifying the support they need.
- Attends CPD provided by the Maths Hub, STEP Teaching School and other providers.
- Keeps parents informed about mathematics issues
- Discusses regularly with the Headteacher and the mathematics governor the progress of implementing National Curriculum for Mathematics in school
- Deploys support staff to address mathematics related needs within the school.
- Monitors and evaluates mathematics provision in the school by conducting regular work scrutiny, learning walks and assessment.

Moderating and Review

Moderating of the standards of children's work and of the quality teaching in mathematics is the responsibility of the mathematics subject leader alongside the Senior Leadership Team and Head Teacher. The work of the mathematics subject leader also involves supporting colleagues in the teaching of mathematics, being informed about current developments in the subject, and providing a strategic lead and direction for the subject in the school. The mathematics subject leader regularly reports to the Head Teacher regarding strengths and weaknesses in the subject and indicates areas for further improvement.

A named member of the school's governing body (Mandy Green) oversees the teaching of mathematics. This governor meets regularly with the subject leader to review progress.

Reviewed: July 2020

To next be reviewed: July 2023

Written by: Edward Holland, Mathematics Coordinator

Appendix 1: Calculation Policy

Church Hill C of E Junior School

Calculation Policy – overview

This policy supports the White Rose maths scheme used throughout the school. Progression within each area of calculation is in line with the programme of study in the 2014 National Curriculum. This calculation policy should be used to support children to develop a deep understanding of number and calculation. This policy has been designed to teach children through the use of concrete, pictorial and abstract representations. It has been taken mainly from the White Rose Calculation Policy and adapted and mapped to meet the specific needs of the children in our school.

Concrete representation— a pupil is first introduced to an idea or skill by acting it out with real objects. This is the use of physical manipulatives that support the conceptual understanding of new learning.

Pictorial representation – the bridge between using the concrete to understanding the abstract maths. This is also a powerful tool to support explanations and proof in maths.

Abstract representation— the numerical representation or algorithm.

Concrete, pictorial and abstract teaching should not be taught in isolation but a mix of two at once to support children's move to a conceptual understanding thus reaching accuracy in using the abstract. When we teach using two of these methods we call this 'dual coding' and it is a way of teaching with more than one learning style.

Expectations by year group

Maths at Church Hill C of E Junior School is tailored to the individual needs of the pupil and adopts the mastery approach. Below map's the expectations of children who would be deemed to be working at the expected standard. Those working at mastery level would be expected to apply this at a deeper level.

Year 3

Addition – add numbers up to 3 digits

Subtraction – subtract numbers up to 3 digits using column subtraction (partitioning).

Multiplication – 2 digit numbers by 1 digit numbers using the grid method.

Division – 2 digit numbers by 1 digit numbers using number lines and repeated subtraction .

Year 4

Addition – add numbers up to 4 digits using full expanded column addition.

Subtraction – subtract numbers up to 4 digits using formal column subtraction.

Multiplication – multiply 2 and 3 digit numbers by a 1-digit number using long multiplication with the calculations written down the side.

Division – 2 digit numbers by 1 digit numbers.

Year 5

Addition – add numbers with more than 4 digits using compact column addition including decimals.

Subtraction – subtract numbers with more than 4 digits using formal column subtraction including decimals.

Multiplication – Multiply numbers up to 4 digits by a 1 or 2-digit number using short column multiplication.

Division – Divide numbers up to 4 digits by a 1-digit number using long division.

Year 6

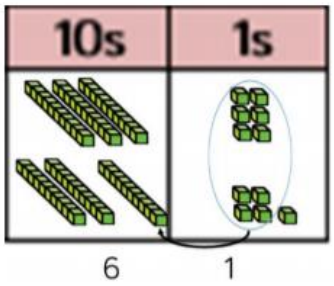
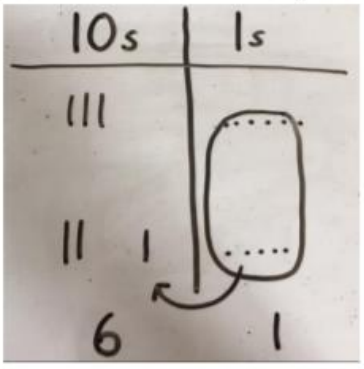
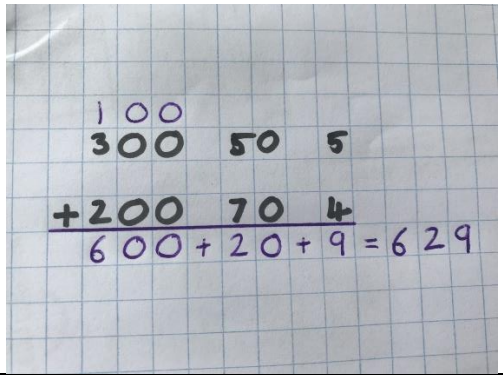
Addition – add numbers with more than 4 digits using compact column addition and including up to 3 decimal places.

Subtraction – subtract numbers with more than 4 digits using formal column subtraction and including up to 3 decimal places.

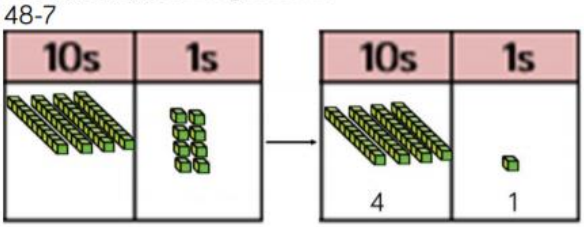
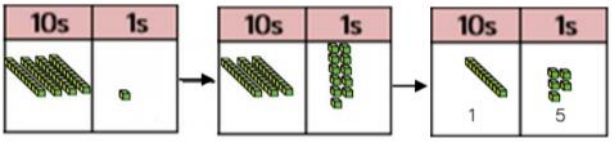
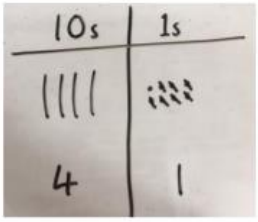
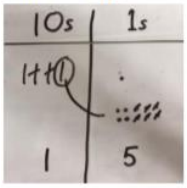
Multiplication – Multiply numbers up to 4 digits by a 2-digit number using short column multiplication including decimals.

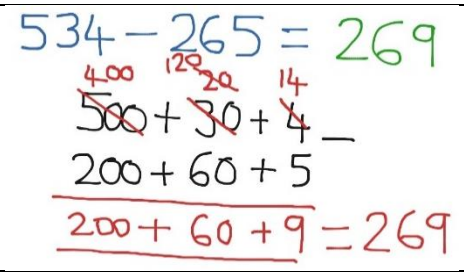
Division – Divide numbers up to 4 digits by a 2-digit number using short division including being able to record your answer as both a remainder or as a decimal.

Year 3 – addition

Add numbers up to 3 digits using expanded column addition with calculations written alongside.	Concrete: **TO + TO using base 10.** Continue to develop understanding of partitioning and place value. 36 + 25  Pictorial: Chidlren to represent the base 10 in a place value chart.  Abstract: 

Year 3 – Subtraction

Subtract numbers up to 3 digits using column subtraction (partitioning).	Concrete: **Column method** using base 10. 48-7  **Column method** using base 10 and having to exchange. 41 – 26  Pictorial: Children to represent the base 10 pictorially.  Represent the base 10 pictorially, remembering to show the exchange.  Abstract: 700 90 8 – 400 50 2 300 + 40 + 6 = 346

534 − 265 = 269
400 120 14
500 + 30 + 4 −
200 + 60 + 5
200 + 60 + 9 = 269

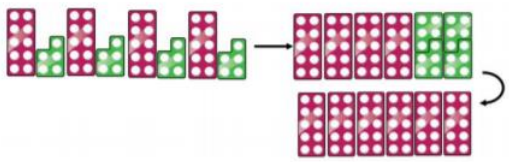
Year 3 – Multiplication

Multiply 2 digit numbers by 1 digit numbers

Children should be able to recall the 2, 5, 10, 3, 4 and 8 multiplication tables.

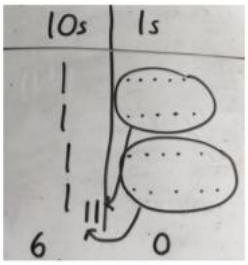
Concrete:

Partition to multiply using Numicon, base 10 or Cuisenaire rods.
4 × 15



Pictorial:

Children to represent the concrete manipulatives pictorially.



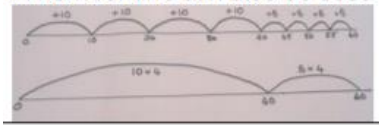
Abstract:

Children to be encouraged to show the steps they have taken.

4 × 15
10 5

10 × 4 = 40
5 × 4 = 20
40 + 20 = 60

A number line can also be used



and

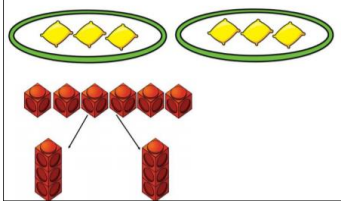
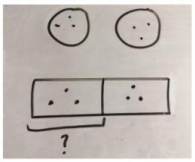
X	30	2
5	150	10

HTU
150
\+ 10
60
100
160

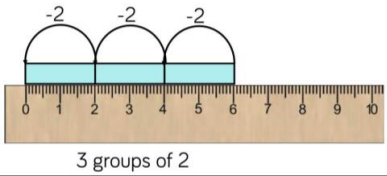
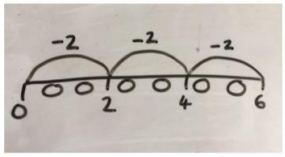
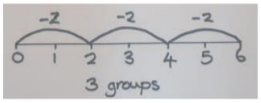
Year 3 Division

2 digit numbers by 1 digit numbers

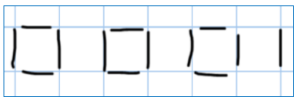
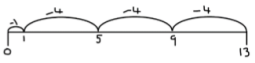
Children should all have the same starting point:

Concrete	Pictorial	Abstract
Sharing using a range of objects. 6 ÷ 2 	Represent the sharing pictorially. 	6 ÷ 2 = 3 3 | 3 Children should also be encouraged to use their 2 times tables facts.

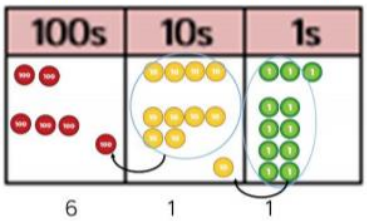
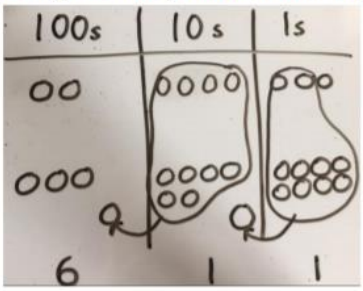
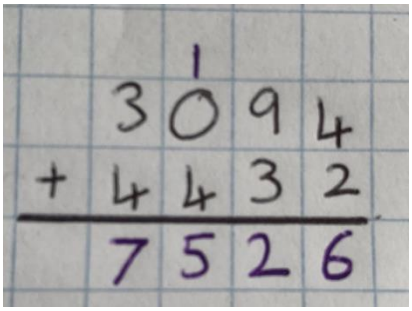
Before progressing to:

Repeated subtraction using Cuisenaire rods above a ruler. 6 ÷ 2  3 groups of 2	Children to represent repeated subtraction pictorially. 	Abstract number line to represent the equal groups that have been subtracted. 

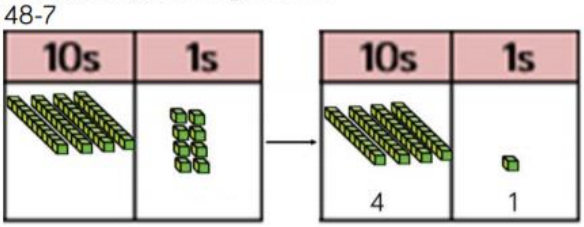
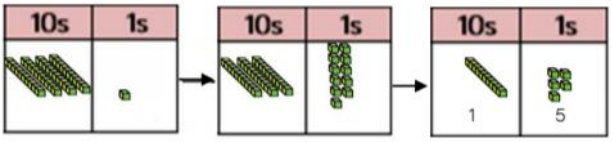
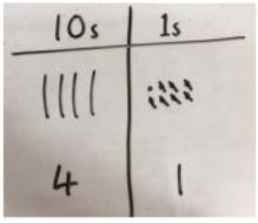
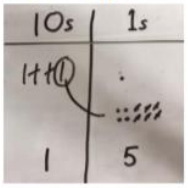
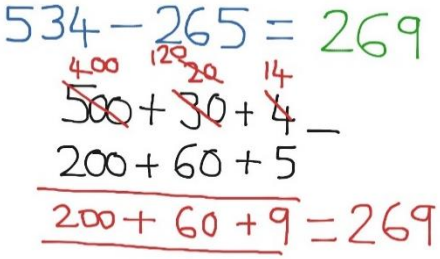
Then start to introduce remainders:

2d ÷ 1d with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used. 13 ÷ 4 Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.  There are 3 whole squares, with 1 left over.	Children to represent the lollipop sticks pictorially.  There are 3 whole squares, with 1 left over.	13 ÷ 4 = 3 remainder 1 Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. '3 groups of 4, with 1 left over' 

Year 4 – addition

Adding numbers with up to 4 digits.	**Concrete:** **Use of place value counters to add HTO + TO, HTO + HTO etc.** When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.  **Pictorial:** Chidren to represent the counters in a place value chart, circling when they make an exchange.  **Abstract:**  Note: carry above

Year 4 – Subtraction

Subtract with numbers up to four digits, including exchanging.	Concrete: **Column method** using base 10. 48-7  **Column method** using base 10 and having to exchange. 41 – 26  Pictorial: Children to represent the base 10 pictorially.  Represent the base 10 pictorially, remembering to show the exchange.  Abstract: 

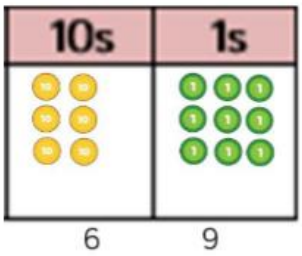
Year 4 – Multiplication

Multiply 2 and 3 digit numbers by 1 digit numbers

Children know all times tables up to 12 x 12

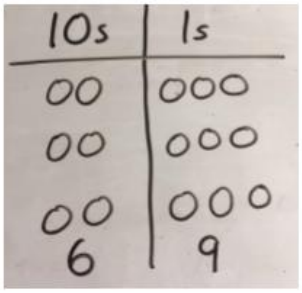
Concrete:

Formal column method with place value counters (base 10 can also be used.) 3 × 23



Pictorial:

Children to represent the counters pictorially.



Abstract:

Children to record what it is they are doing to show understanding.

3 × 23

20 3

3 × 20 = 60

3 × 3 = 9

60 + 9 = 69

$$\begin{array}{r} 23 \\ \times\ 3 \\ \hline 69 \end{array}$$

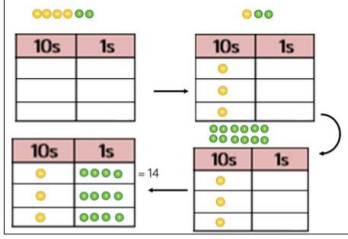
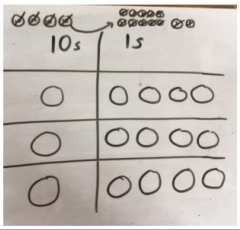
leading to

$$\begin{array}{rl} 3\,1\,4 & \\ \times\ 3 & \\ \hline 1\,2 & (3 \times 4) \\ 3\,0 & (3 \times 10) \\ +\ 9\,0\,0 & (3 \times 300) \\ \hline 9\,4\,2 & \end{array}$$

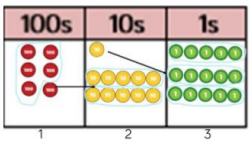
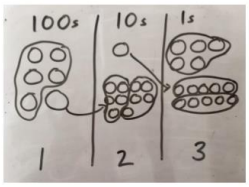
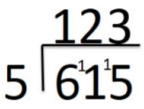
Year 4 Division

Dividing 3 digit numbers by 1 digit numbers

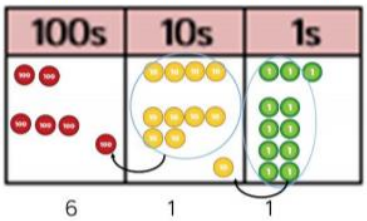
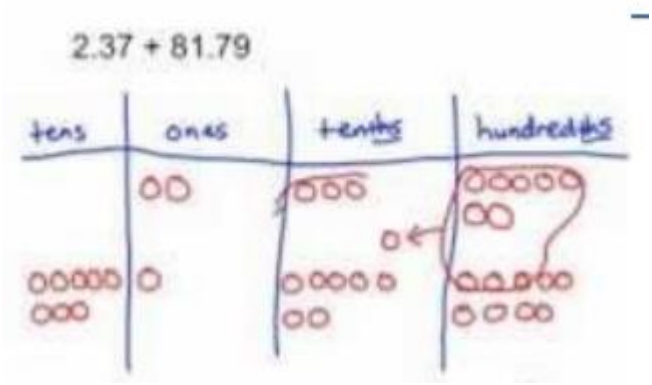
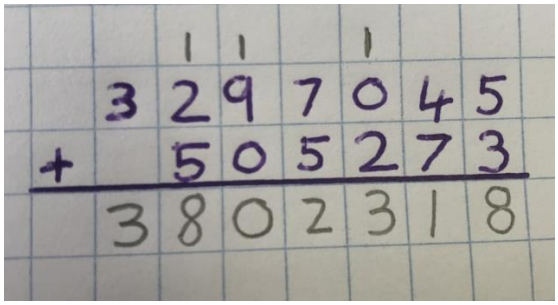
Children should all have the same starting point:

Sharing using place value counters. 42 ÷ 3 = 14	Children to represent the place value counters pictorially.	Children to be able to make sense of the place value counters and write calculations to show the process.
		42 ÷ 3 42 = 30 + 12 30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14

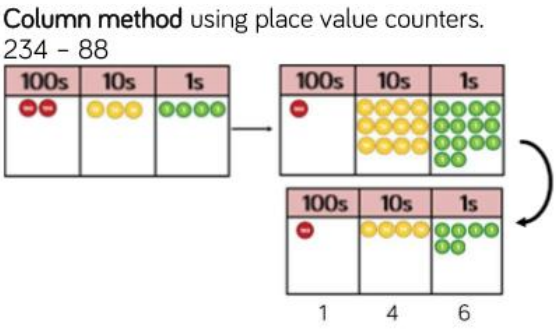
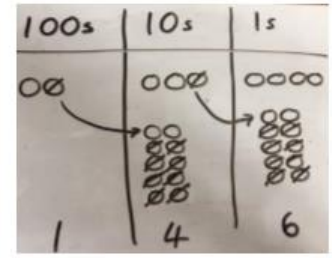
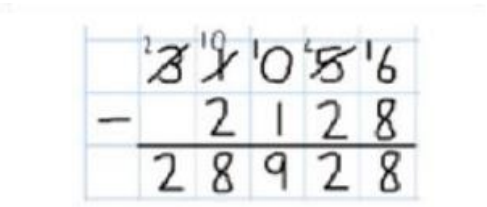
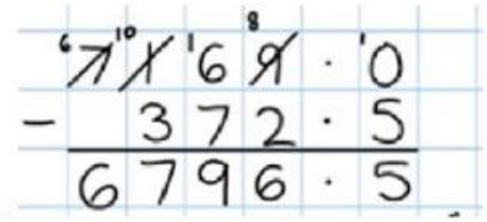
Before progressing to:

Short division using place value counters to group. 615 ÷ 5	Represent the place value counters pictorially.	Children to the calculation using the short division scaffold.
 1. Make 615 with place value counters. 2. How many groups of 5 hundreds can you make with 6 hundred counters? 3. Exchange 1 hundred for 10 tens. 4. How many groups of 5 tens can you make with 11 ten counters? 5. Exchange 1 ten for 10 ones. 6. How many groups of 5 ones can you make with 15 ones?		

Year 5 – addition

Adding numbers with more than 4 digits including decimals	Concrete: **Use of place value counters to add HTO + TO, HTO + HTO etc.** When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.  Pictorial:  Abstract:  Note: carry above

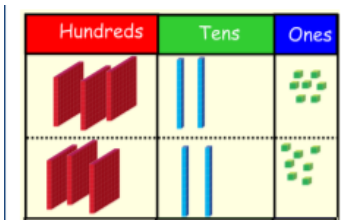
Year 5 – Subtraction

Subtract with at last 4 digits, including exchanging and 2 decimal places.	Concrete:  Pictorial:  Abstract:  

Year 5 – Multiplication

Multiply up to 4 digit numbers by up to 2 digit numbers using long division

Concrete:



It is important at this stage that they always multiply the ones first.

Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. 321 x 2 = 642

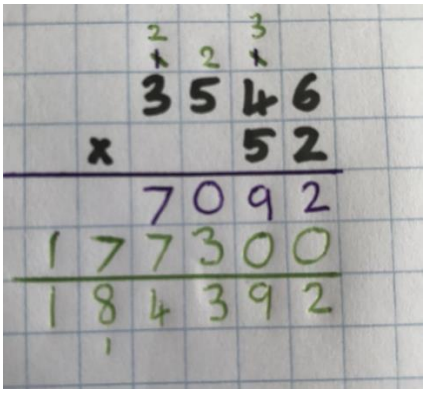
Pictorial:

x	300	20	7
4	1200	80	28

Abstract:

```
 3 1 4
   x 3
 ------
   1 2    (3 x 4)
   3 0    (3 x 10)
+ 9 0 0    (3 x 300)
 ------
   9 4 2
```

leading to

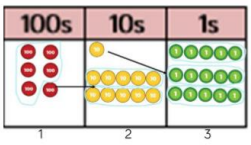


Year 5 Division

Divide up to 4 digit numbers using short division

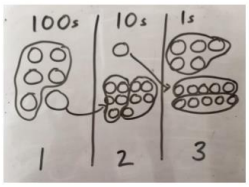
Short division:

Short division using place value counters to group.
615 ÷ 5



1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?

Represent the place value counters pictorially.



Children to the calculation using the short division scaffold.

$$5\overline{)615} = 123$$

and then to 4 digit by 2 digit division :

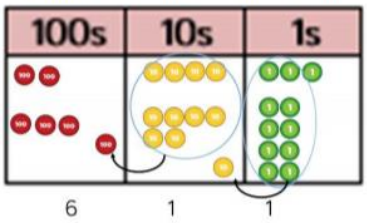
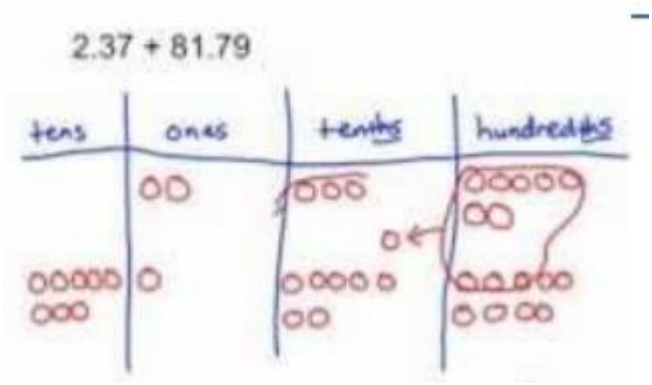
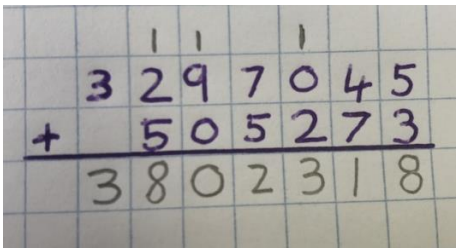
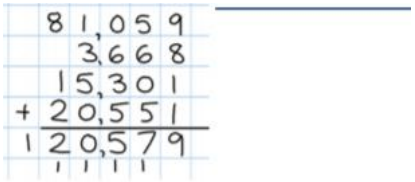
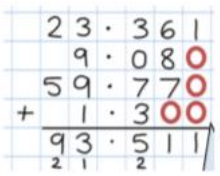
$$23\overline{)4945} = 215$$

Check: $23 \times 10 = 230$

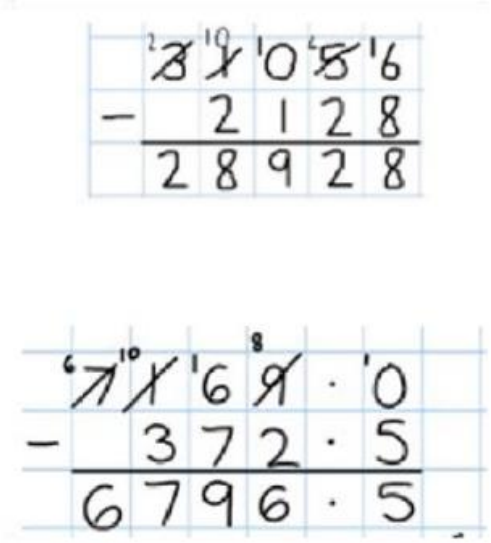
23	23
46	46
69	69
92	92
115	115
138	138
161	161
184	184
207	207
230	230

184 + 23 = 207 + 23 = 230

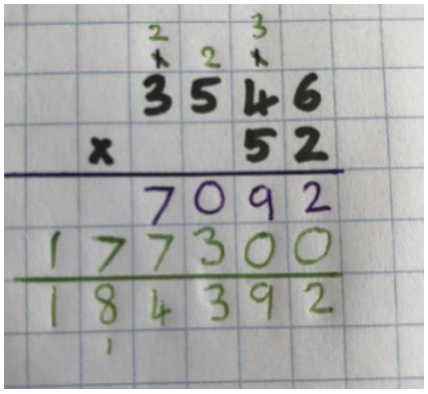
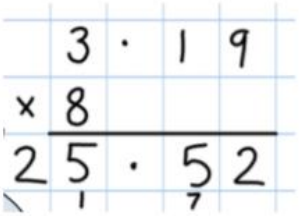
Year 6 – addition

Adding several numbers with up to 3 decimal places	Concrete: **Use of place value counters to add HTO + TO, HTO + HTO etc.** When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.  Pictorial:  Abstract:  and  Insert zeros for place holders.  Note: carry above

Year 6 – Subtraction

Subtracting with increasingly more complex numbers including decimals	Abstract: 

Year 6 – Multiplication

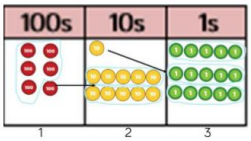
Short and long multiplication with up to 2 decimal places	Abstract:  and Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer. 

Year 6 Division

Divide up to 4 digit numbers using short and long division

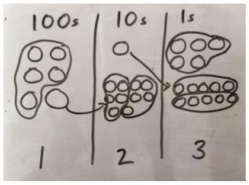
Short division:

Short division using place value counters to group.
615 ÷ 5



1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?

Represent the place value counters pictorially.



Children to the calculation using the short division scaffold.

$$5\overline{)615} = 123$$

and then to 4 digit by 2 digit division:

$$23\overline{)4945} = 215$$

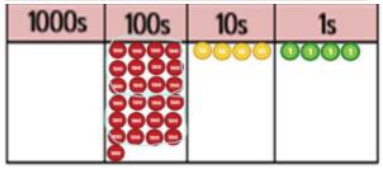
Check: $23 \times 10 = 230$

23, 46, 69, 92, 115, 138, 161, 184, 207, 230

Long division:

Long division using place value counters
2544 ÷ 12

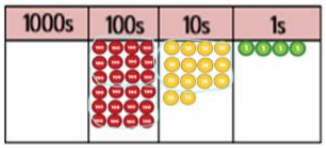
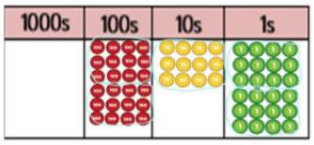
We can't group 2 thousands into groups of 12 so will exchange them.



We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

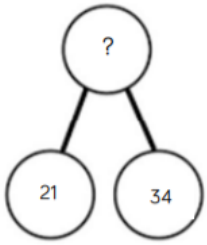
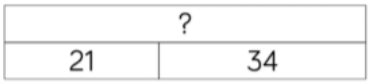
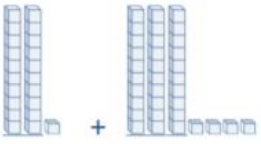
$$12\overline{)2544} = 02 \text{ r } 1$$

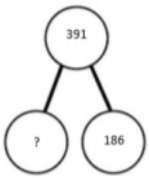
24

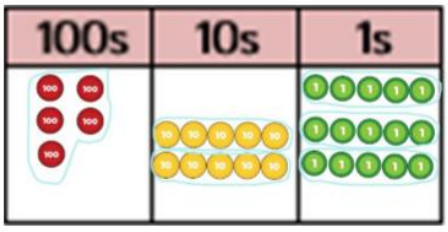
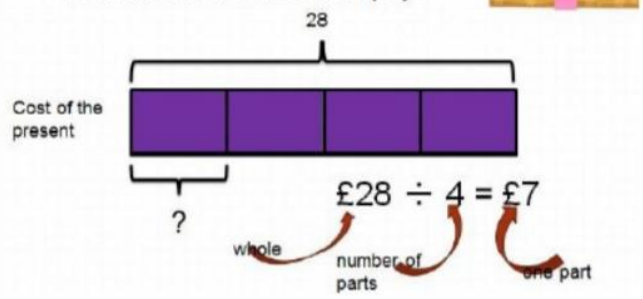
	 After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens. $\begin{array}{r} 021 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 2 \end{array}$  After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder. $\begin{array}{r} 0212 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 24 \\ 24 \\ \hline 0 \end{array}$

Bar modelling and conceptual variation

In addition to the methods taught above, it is also vital that the children and exposed to and taught a wide range of conceptual variations to apply the skills in order to achieve mastery and to understand the mathematics in a deeper context. Below shows some examples of conceptual variations for each operation which can be adapted to suit the required level of challenge:

Addition	  Word problems: In year 3, there are 21 children and in year 4, there are 34 children. How many children in total? 21 + 34 = 55. Prove it 21 +34 21 + 34 = □ = 21 + 34 Calculate the sum of twenty-one and thirty-four.  Missing digit problems: 

Subtraction	 391 186 ? □ = 391 – 186 391 -186 What is 186 less than 391? Raj spent £391, Timmy spent £186. How much more did Raj spend? Calculate the difference between 391 and 186. Missing digit calculations 3 9 □ - □ □ 6 □ 0 5
Multiplication	23 23 23 23 23 23 ? Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week? With the counters, prove that 6 x 23 = 138

	Find the product of 6 and 23 $6 \times 23 =$ $\square = 6 \times 23$ $\begin{array}{r} 6 \\ \times\ 23 \\ \hline \end{array}$ $\begin{array}{r} 23 \\ \times\ 6 \\ \hline \end{array}$	What is the calculation? What is the product? 
Division	Using the part whole model below, how can you divide 615 by 5 without using short division?  $5 \overline{)615}$ $615 \div 5 =$ $\square = 615 \div 5$	I have £615 and share it equally between 5 bank accounts. How much will be in each account? 615 pupils need to be put into 5 groups. How many will be in each group? What is the calculation? What is the answer?  Four children bought a present for £28. They shared the costs equally. How much did each child pay?  

Appendix 2: White Rose scheme of learning

All documents relating to the schemes of learning can be accessed using the link below:

https://whiterosemaths.com/resources/schemes-of-learning/primary-sols/