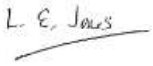
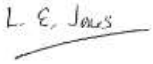
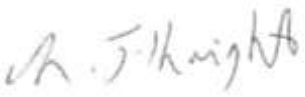
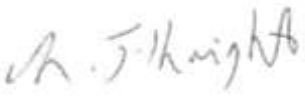
St Paul's CE (VC) First School

Coven

Maths and Calculation Policy

April 2024

Comments:	Annual Review Or more frequently if legislation and guidance changes.
Policy Created:	Adopted by Governing Body on 19th April 2016  Jenny Picken, Chair of Governors
Signed:	 L.Jones, Vice Chair of Governors, 24/05/17
Reviewed:	On 23rd May 2018 at Curriculum Committee Meeting  Lorna Jones, Chair of Governors, 23/5/18
Reviewed:	On 8th May 2019 at Curriculum Committee Meeting  Lorna Jones, Chair of Governors, 8/5/19
Reviewed:	On 22nd June 2020 at LAC Committee Meeting  Antony Hyett, Chair of Governors, 22/6/20
Reviewed:	On 10th May 2021 at LAC Committee Meeting  Luke Knight, Chair of Governors, 10/5/21
Reviewed:	On 14th March 2022 at LAC Committee Meeting  Luke Knight, Chair of Governors, 14/3/22
Reviewed:	On 21st March 2023 at LAC Committee Meeting  Luke Knight, Chair of Governors, 21/3/23
Reviewed:	On 22nd May 2024 at LAC Meeting

	 Jo Sawyer, Chair of Governors, 22nd May 2024

Introduction

"Mathematics is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject". (Statutory Guidance, National Curriculum in England: Mathematics Programme of Study, 2014).

At St Paul's First School we aspire to develop their confidence in Maths and achieve their full potential. We aim to give all of our pupils necessary fluency skills, which they can use and apply to problems and be ready to tackle any situation they may be faced with.

Our Aim

To ensure all children have the opportunity to develop their fluency skills and, their ability to reason and justify their answers. This will be done through careful planning and delivery of Maths in contexts applicable to real life.

The implementation of this policy is the responsibility of all members of staff.

Implementation

This policy is to ensure consistency throughout the school.

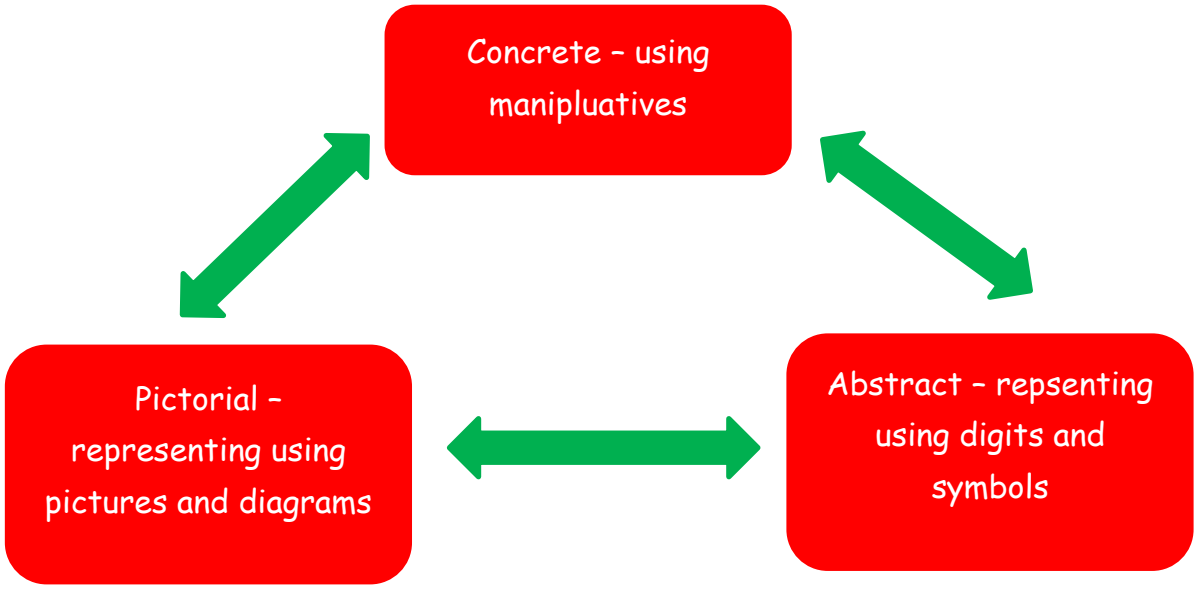
The planning and teaching of Maths is the responsibility of the class teacher. The Maths Lead can offer support and/or guidance to the class teacher if necessary.

Maths occurs for 1 hour per day in Years 1-4 and there is a daily mastering number session which takes place for 15 minutes in Reception, Year 1 and Year

2. In addition to this, mathematical skills will be applied to different subjects such as data-handling skills within Science.

In the Early Years there will be a daily dedicated Maths time. In Reception children will complete one piece of adult led Maths focus work per week. In the The Maths focus is integrated into everyday activities within the classroom. In each classroom there is a Maths Area, challenges are changed frequently based on child engagement and interest. Maths runs throughout all areas of learning allowing children to make cross curricular links and become problem solvers!

The 'White Rose' scheme of Maths is used as a basis for our long term Maths plan. At St Paul's we follow the Concrete, Pictorial and Abstract (CPA) approach.



The concrete, pictorial, abstract approach is a progressive teaching strategy to ensure that children's learning and understanding is deep. Therefore, they can apply this to different contexts and situations. Concrete refers to the physical resources and objects which children may use to investigate with, identify patters with and reason with others, to reach possible answers / solutions. Once children are secure with using concrete material to understand an idea they progress to representing the model through pictures and diagrams. The final stage of children's understanding is for them to represent the model using numbers and symbols. This is the abstract part of this approach.

At St Paul's we follow the White Rose Maths scheme of learning. In Years 1-4 children follow the scheme and complete the workbook tasks. This is adapted and scaffolded for less able learners, there is also a 'gold' extension task

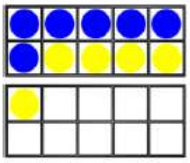
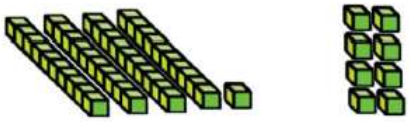
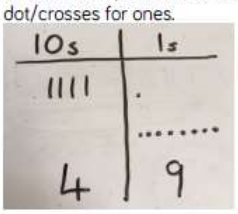
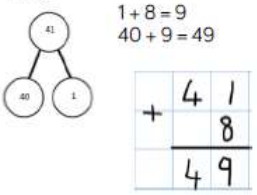
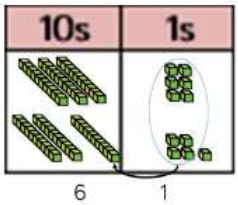
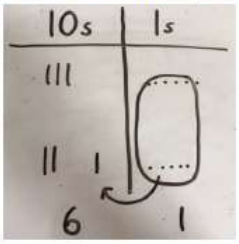
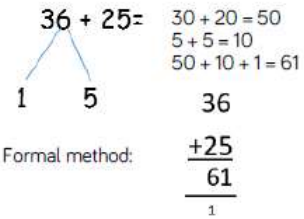
planned each day as an extension activity. This is available for all children. All children complete an Oscar Owl reasoning challenge at the end of their Maths lesson, this is linked to the learning objective.

In addition to this Numicon teacher handbooks, Numicon problem solving text books and Rising Stars Problem Solving Toolkits are also used as a planning tool.

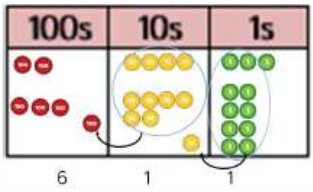
Calculation Policy

This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further material added.

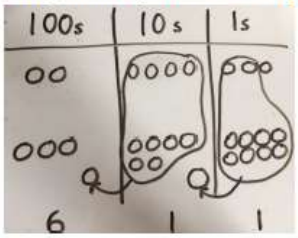
Addition

Regrouping to make 10; using ten frames and counters/cubes or using Numicon. 6 + 5 	Children to draw the ten frame and counters/cubes. 	Children to develop an understanding of equality e.g. 6 + □ = 11 6 + 5 = 5 + □ 6 + 5 = □ + 4
TO + O using base 10. Continue to develop understanding of partitioning and place value. 41 + 8 	Children to represent the base 10 e.g. lines for tens and dot/crosses for ones. 	41 + 8 
TO + TO using base 10. Continue to develop understanding of partitioning and place value. 36 + 25 	Chidlren to represent the base 10 in a place value chart. 	Looking for ways to make 10. 

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.

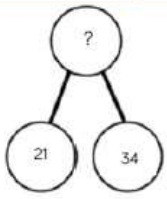


Children to represent the counters in a place value chart, circling when they make an exchange.



$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1\ 1 \end{array}$$

Conceptual variation; different ways to ask children to solve 21 + 34



?	
21	34

Word problems:
In year 3, there are 21 children and in year 4, there are 34 children.
How many children in total?

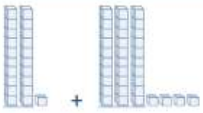
21 + 34 = 55. Prove it

$$\begin{array}{r} 21 \\ +34 \\ \hline \end{array}$$

21 + 34 =

$\square$ = 21 + 34

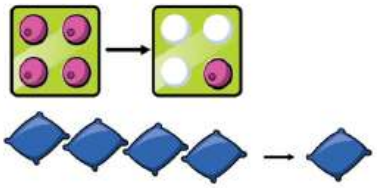
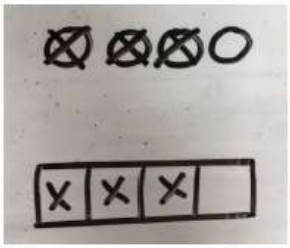
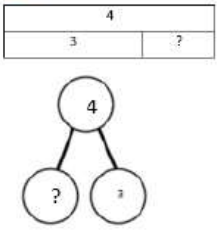
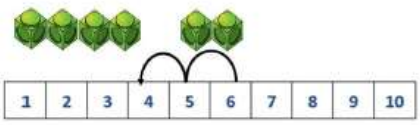
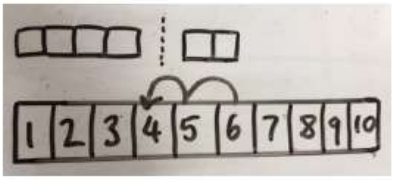
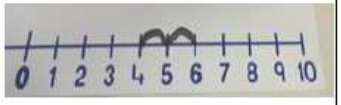
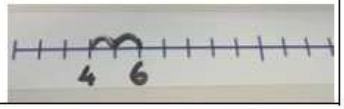
Calculate the sum of twenty-one and thirty-four.

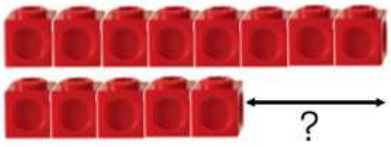
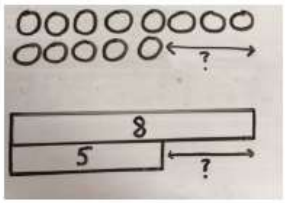
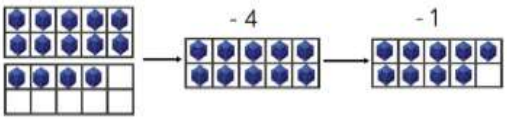
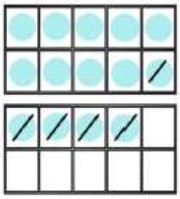
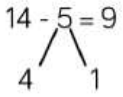
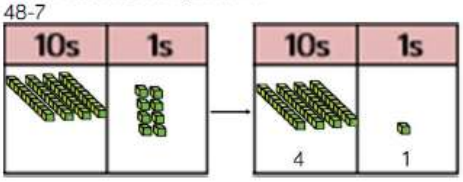
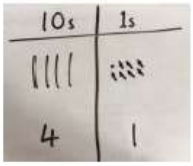
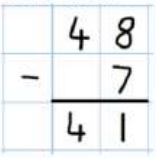


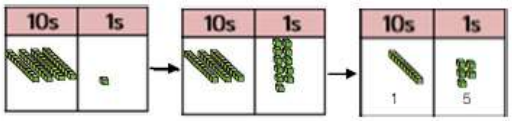
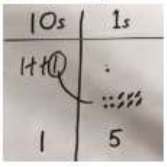
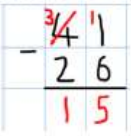
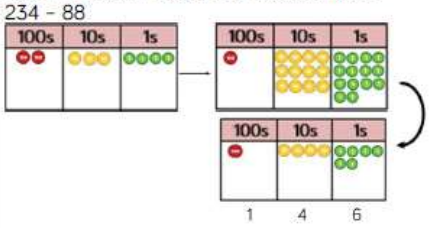
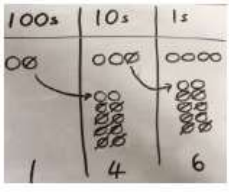
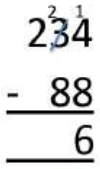
Missing digit problems:

10s	1s
	1
	?
?	5

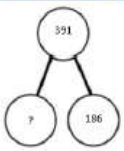
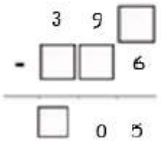
Subtraction

Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used). 4 - 3 = 1 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	4- 3 = $\square$ = 4 - 3 
Counting back (using number lines or number tracks) children start with 6 and count back 2. 6 - 2 = 4 	Children to represent what they see pictorially e.g. 	Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line  

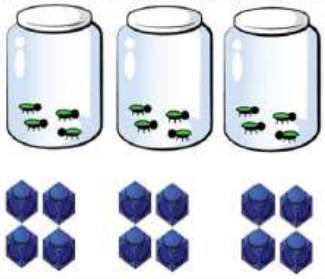
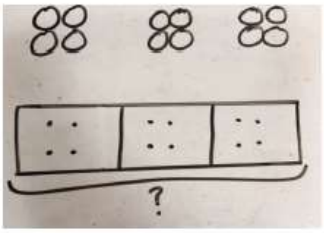
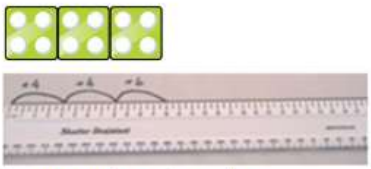
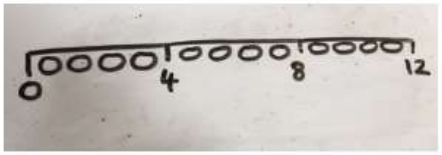
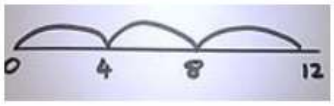
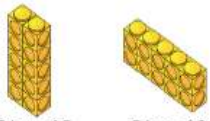
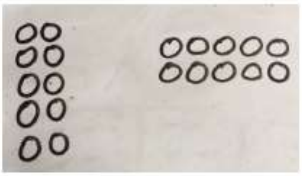
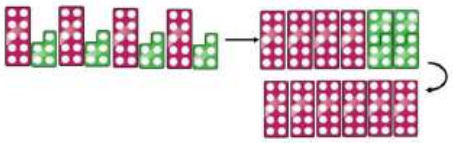
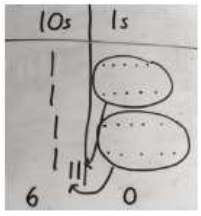
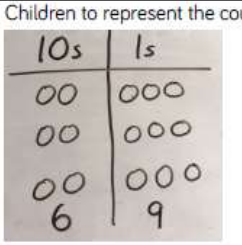
Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used). Calculate the difference between 8 and 5.  	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.  	Find the difference between 8 and 5. 8 – 5, the difference is ☐ Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.
Making 10 using ten frames. 14 – 5  	Children to present the ten frame pictorially and discuss what they did to make 10. 	Children to show how they can make 10 by partitioning the subtrahend.  14 – 4 = 10 10 – 1 = 9
Column method using base 10. 48-7  	Children to represent the base 10 pictorially.  	Column method or children could count back 7. 

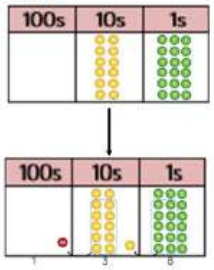
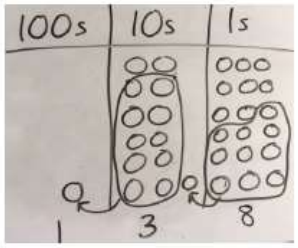
Column method using base 10 and having to exchange. 41 – 26  	Represent the base 10 pictorially, remembering to show the exchange.  	Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11. 
Column method using place value counters. 234 – 88  	Represent the place value counters pictorially; remembering to show what has been exchanged.  	Formal colum method. Children must understand what has happened when they have crossed out digits. 

Conceptual variation; different ways to ask children to solve 391 - 186

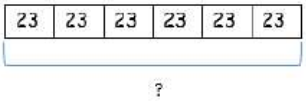
 391 186 ?	Raj spent £391, Timmy spent £186. How much more did Raj spend? Calculate the difference between 391 and 186.	☐ = 391 – 186 391 -186 ___ What is 186 less than 391?	Missing digit calculations 

Multiplication

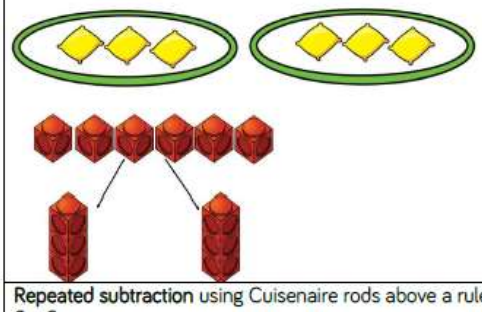
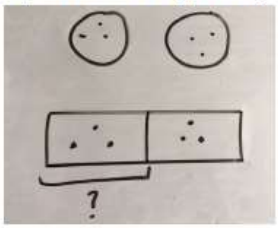
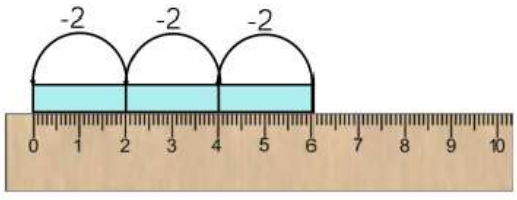
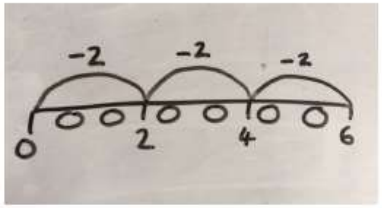
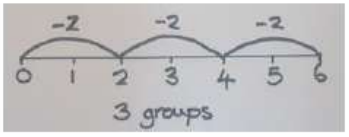
Concrete	Pictorial	Abstract
Repeated grouping/repeated addition 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 	Children to represent the practical resources in a picture and use a bar model. 	3 × 4 = 12 4 + 4 + 4 = 12
Number lines to show repeated groups- 3 × 4  Cuisenaire rods can be used too.	Represent this pictorially alongside a number line e.g.: 	Abstract number line showing three jumps of four. 3 × 4 = 12 
Use arrays to illustrate commutativity counters and other objects can also be used. 2 × 5 = 5 × 2  2 lots of 5 5 lots of 2	Children to represent the arrays pictorially. 	Children to be able to use an array to write a range of calculations e.g. 10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5
Partition to multiply using Numicon, base 10 or Cuisenaire rods. 4 × 15 	Children to represent the concrete manipulatives pictorially. 	Children to be encouraged to show the steps they have taken. 4 x 15 10 5 10 x 4 = 40 5 x 4 = 20 40 + 20 = 60 A number line can also be used 
Formal column method with place value counters (base 10 can also be used.) 3 × 23  6 9	Children to represent the counters pictorially. 	Children to record what it is they are doing to show understanding. 3 × 23 3 × 20 = 60 3 × 3 = 9 20 3 60 + 9 = 69 23 × 3 69

Formal column method with place value counters. 6 x 23 	Children to represent the counters/base 10, pictorially e.g. the image below. 	Formal written method 6 x 23 = 23 × 6 138 1 1
When children start to multiply 3d × 3d and 4d × 2d etc., they should be confident with the abstract: To get 744 children have solved 6 × 124. To get 2480 they have solved 20 × 124.		1 2 4 × 2 6 7 4 4 2 4 8 0 3 2 2 4 1 1 Answer: 3224

Conceptual variation; different ways to ask children to solve 6 × 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 × 23 = □ = 6 × 23 6 × 23 23 × 6	What is the calculation? What is the product? 

Division

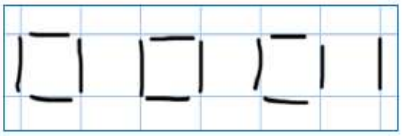
Concrete	Pictorial	Abstract
Sharing using a range of objects. 6 ÷ 2 	Represent the sharing pictorially. 	6 ÷ 2 = 3 3 | 3 Children should also be encouraged to use their 2 times tables facts.
Repeated subtraction using Cuisenaire rods above a ruler. 6 ÷ 2  3 groups of 2	Children to represent repeated subtraction pictorially. 	Abstract number line to represent the equal groups that have been subtracted. 

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.

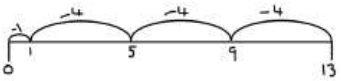


There are 3 whole squares, with 1 left over.

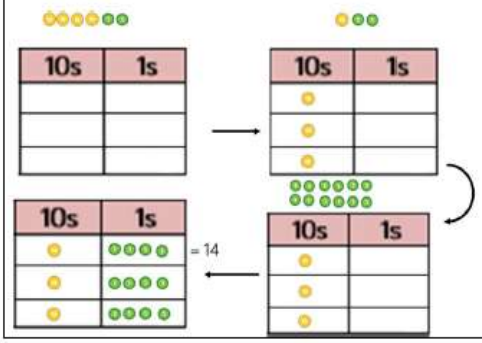
13 ÷ 4 = 3 remainder 1

Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line.

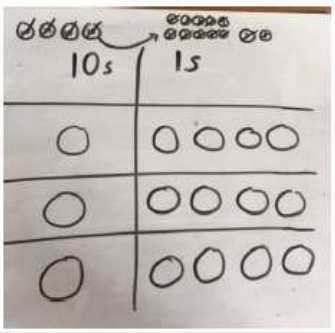
'3 groups of 4, with 1 left over'



Sharing using place value counters.
42 ÷ 3 = 14



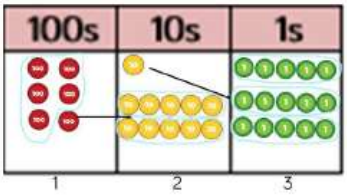
Children to represent the place value counters pictorially.



Children to be able to make sense of the place value counters and write calculations to show the process.

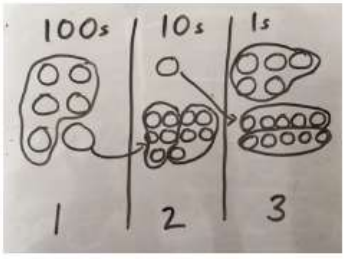
42 ÷ 3
42 = 30 + 12
30 ÷ 3 = 10
12 ÷ 3 = 4
10 + 4 = 14

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?

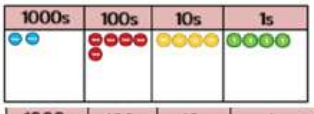
Represent the place value counters pictorially.



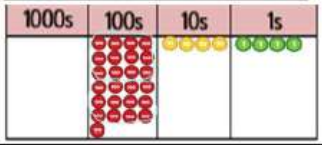
Children to the calculation using the short division scaffold.

$$5\overline{)615}^{\,123}$$

Long division using place value counters
2544 ÷ 12

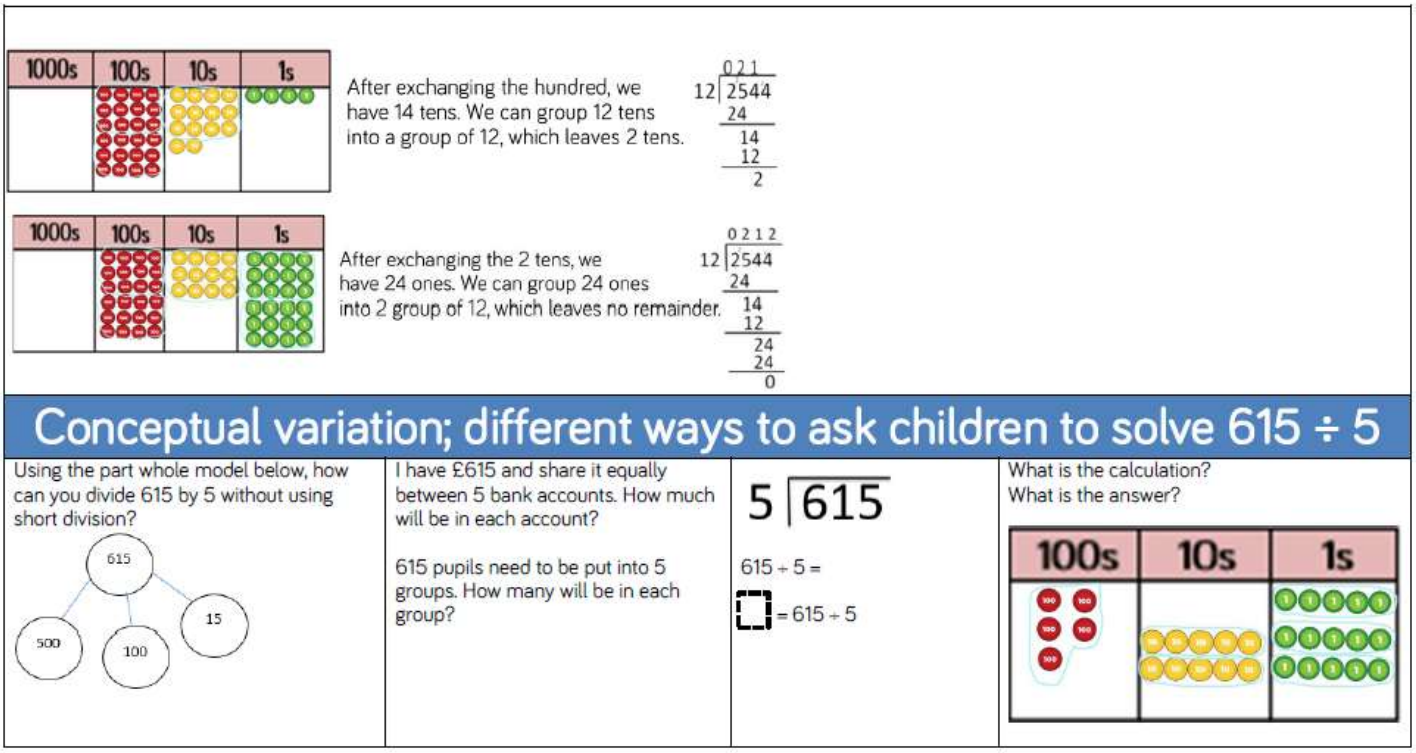


We can't group 2 thousands into groups of 12 so will exchange them.



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

$$12\overline{)2544}^{\,212}$$
$$\underline{24}$$
$$1$$



Assessment

Assessment is carried out in line with the agreed school Assessment Policy. Formative assessments are carried out on a regular basis by staff throughout lessons.

At the end of every term children in Y1 – Y4 complete a Cornerstones Assessment. Children also complete end of unit assessments from White Rose Maths at the end of a unit of work. This data is analysed by class teachers and the Maths lead and gap planning is then implemented.

Staff Y1-Y4 assess children at the end of each term based on independent work in their books and Cornerstones assessments. In Early Years staff assess children termly based on adult led tasks in books, independent work within learning journeys and observations.

Evidence of Maths will be kept in Maths books and workbooks where children will produce the majority of their work. There may be some cross curricular Maths that can be found in children's Science and Topic books.

SEND

The Maths curriculum should fulfil the needs of all pupils. When planning work for children with special educational needs, due regard is given to the information and targets contained in the children's Individual Provision Maps (IPPs). We have high expectations of all of our children, and ensure that learners have high expectations of themselves.

Racial Equality & Equal Opportunities

All children have equal access and inclusive rights to the curriculum regardless of their gender, race, disability or ability. We plan work that is differentiated for the performance of all groups and individuals. St. Paul's First School is committed to creating a positive climate that will enable everyone to work free from racial intimidation and harassment and to achieve their full potential.

Reporting to Parents

Parents are kept well informed about their child's attainment and progress. Two formal parents' evenings are organised each year as well as a drop in session at the end of the school year. Here class teachers can discuss how their child is progressing in Maths. In addition to this, parents are given an interim report half way through the academic year and a full written report at the end of the academic year. These reports detail progress, attainment and effort; class teachers make a comment about the individual child.

The school operates a system whereby parents are welcome to make an appointment to see their child's work and discuss this with them. Parents may request an appointment to see their child's teacher at any point throughout the year. Parents have access to teacher's email addresses and can use these to contact them in necessary. At St Paul's we have an open door policy for parents.

Liaison

The Maths Subject Leader has liaised with staff providing long term plans, advice on planning. Staff meetings may also be put in place throughout the year to ensure all staff are informed of any changes to Maths.

Records of pupils' progress are passed to the receiving teacher within St Paul's at the end of each academic year via the child's end of year report.

Monitoring - Subject Leadership

The Maths Subject Leader will regularly monitor the quality of Maths throughout the school. This monitoring may include; learning walks, book scrutinies, planning meetings, team teaching and pupil voice.

The subject will also be monitored in terms of coverage, continuity and progression to ensure that all children are receiving the best possible Maths Education.

The Maths subject leader will ensure that her subject knowledge and expertise are kept up to date by means of regular training. With this, the Maths subject leader will ensure that staff receive adequate training in the teaching and assessment of Maths.

The Maths subject leader will liaise with the governor who holds responsibility for Maths and they will report regularly to the governing body on progress and attainment in Maths.

Review

The Maths and Calculation Policy is to be reviewed on a regular basis as scheduled in the School Development Plan.

Signed: