Nursery Hill Primary

Mathematics Policy

2021-2022

Mission Statement

"A high-quality Mathematics education 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." (National Curriculum 2014)

At Nursery Hill Primary, all our children are given the opportunity to develop their mathematical potential through a rich, engaging curriculum. We want our children to feel confident in using and applying Mathematics in a wide range of situations. We believe that Mathematics is uniquely powerful in helping us to make sense of, and describe, our world and in enabling us to solve problems. It is a fascinating subject, dealing with the nature of number, space, pattern and relationships. Useful and creative, it requires not only facts and skills, but also understanding gained through exploration, application and discussion. In Mathematics we aim to develop lively, enquiring minds encouraging pupils to become self-motivated, confident and capable in order to solve problems that will become an integral part of their future.

School Aims

The purpose of Mathematics education is to offer pupils intellectual excitement and challenge; to provide them with a sense of delight and wonder; to equip them with knowledge and skills and the ability and confidence to use and apply these to meet the needs of present and future society. Nursery Hill Primary aims to ensure that all pupils, irrespective of gender, race and culture, have access to a wide range of stimulating problems and activities which will include the appropriate Programmes of Study of the National Curriculum 2014 and the EYFS curriculum. As they move from home into school and from primary into secondary education, their mathematical experience should be continuous and progressive, producing competent and confident young mathematicians. We ensure that the statutory requirements of the National Curriculum 2014 and EYFS are met and so too are their aims:

• To become fluent in the fundamentals of Mathematics
• Reason mathematically
• Solve problems

Intent

Our pupils will learn to:

- Develop the appropriate mathematical language associated with number, shape and position;
- Use and apply Mathematics in practical tasks, in real life problems and in acquiring further knowledge, skills and understanding in the subject itself;
- Understand and use the four operations of number in relevant contexts;
- Understand relationships between numbers, learn basic number facts and develop a range of computational methods;
- Understand place value in our counting system and understand how it can be extended into numbers below zero;
- Use their mathematical skills in simple problem solving;
- Collect, interpret and represent data in tabular, graphical and diagrammatic form;
- Develop mental methods of calculation;
- Recognise, describe and represent shapes and patterns in terms of their properties, location and movement;
- Measure quantities including length, area, volume/capacity, angle, temperature, time and mass;
- By the time children reach Year 6 they will be introduced to ratio/ proportion and language of algebra as a means for solving a variety of problems.

We will judge the success of our mathematical teaching by:-

- The motivation and interest displayed by our pupils e.g. through pupil voice;
- On-going assessment (formative and summative);
- Success in meeting targets linked to age-related expectations;
- Monitoring of outcomes for pupils
- Observations of the quality of Mathematics teaching;
- Analysis of pupil progress and attainment data.

Teaching and Learning

All pupils are entitled to a broad Mathematics curriculum in which their learning needs are identified and met. Pupils should experience a range of practical and written activities on number, measurement, geometry and statistics. We operate a planning procedure agreed by the whole teaching staff based upon the National Curriculum Mathematics Programmes of Study 2014 and the EYFS Curriculum. Classrooms should be rich in discussion between pupils and between teacher and pupils. Some facts will need to be memorised, others will need to be practised but underpinning all of this will be the development of mathematical reasoning and understanding through exploration, problem solving and investigation.

Implementation

Long and medium term planning

Long term and medium term planning is taken from the White Rose Hub Mathematics mastery scheme. The schemes provide exemplification for each of the objectives in the new term by term overviews, which are linked to the new National Curriculum. The schemes are broken down into fluency, reasoning and problem solving, which are the key aims of the curriculum. Each objective has with it examples of key questions, activities and resources. These are used in tandem with the mastery assessment materials that the NCETM have produced and 'Maths No Problem' text books in the Singapore style of teaching.

Short term planning

- Each lesson will begin with a daily arithmetic task, this will be recorded in books and the class teacher will model the answers, children will mark, TAs will take note of any children falling behind. These children will be taken out for a short intervention during the afternoon session to address misconceptions.
- Each lesson will ensure that focus is on developing mathematical skill in relation to the 3 aims of the national curriculum. Fluency, reasoning and problem solving. See – ***Medium and short term plans***
- Conceptual understanding (comprehension of mathematical concepts, operations, and relationships) must be considered. See - ***The Big Ideas section on the NCETM Mastery assessment documentation***
- Likely misconceptions must be shared with the children. See - ***NCETM Misconceptions document***
- Concrete- pictorial - abstract resources must support learning.
- Vocabulary - any new terminology or vocabulary within the session must be shared.
- Concept questions for understanding - are used to probe children's clarity of understanding of the methods/new concepts taught.
- Questions for deeper understanding - these questions develop children's reasoning skills. See – ***Mastery question stems document***
- *ARE expectations* – the year group expectation will be planned for.
- *GDS expectations* - the expectations for rapid graspers will be planned for.
- Staff must ensure that they only move children on in their learning when they are ready. Staff are not expected to type up any changes / additions to the weekly plan. Planning can be annotated.
- Planning from previous years can be annotated however, a planning proforma with these specifics is provided.

Teaching time and structure
Mathematics is taught for a minimum of 5 hours per week in KS1 and KS2. Mathematics lessons are differentiated using concrete, pictorial and abstract resources.

Each lesson has the following structure:

- A (4, 5, 6)-A-Day calculation activity
- The main teaching
- Opportunities to apply new learning through activities focussing on the three aims
- Plenary

In Reception, Mathematics is taught daily in three differentiated groups. Pupils in Reception use a variety of concrete resources developing on to pictorial representations which are the foundations for abstract methods.

Recording work
All pupils in KS1 and KS2 use a pencil for mathematical calculations and squared exercise books to aid setting out of calculations. Pupils use 7mm squared books. Pupils are taught suitable setting out of work and this is modelled in every day practise. On starting new work pupils rule off the last piece of work and date the next piece. The date is recorded in figures e.g. 23.11.03, unit title and the Learning Objective/WALTs are copied or stuck into children's books. Margins are 2 squares wide. 5 a day arithmetic will be self-marked by the pupils, all other work is marked according to the school's Feedback Policy, using live marking where possible.

Preparation for the Year 4 Times Tables check
The purpose of the MTC is to determine whether year 4 pupils can fluently recall their multiplication tables. Although the check will help school to identify pupils who require additional support, it is not intended as a diagnostic tool.

- The MTC is a key stage 2 assessment to be taken by pupils at the end of year 4.
- The MTC is focused on the fluent recall of multiplication facts. This is included in the national curriculum (2014) statutory programme of study for mathematics at key stage 1 and KS2.
- The MTC will be delivered as an online, on-screen digital assessment. Under standard administration, the check will take each pupil less than 5 minutes to complete. It will be automatically scored, and results will be available to schools once the assessment window closes.

The content domain for the MTC is based on the national curriculum (2014). The national curriculum states, 'By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work'.

The year 4 programme of study for mathematics also states, 'Pupils should be taught to recall multiplication and division facts for multiplication tables up to 12 × 12'. The MTC only assesses the instant recall of multiplication facts. Multiplication and division in a wider context will continue to be assessed through the KS1 and KS2 mathematics assessments.

In years 3 and 4 additional time slots will be included on the timetable to ensure children are secure in this knowledge. Pupils will also be provided with a login for Times Table Rock stars which has been developed to engage pupils in daily practice.

Impact

How will we know we are successful in this is through:

- Teacher assessment – formative – through ongoing questioning, Quick recall of facts and procedures, dialogue, verbal and written feedback, day to day work, daily arithmetic outcomes, reasoning. Summative – end of half term tests, statutory assessments

- Pupil Voice – pupil questionnaires, self and peer assessment, learning dialogue in the classroom that encourages self-evaluation.
- Data Analysis – internal with SLT, subject leadership, pupil progress meetings, governors, external data (SATS)
- Quality Assurance – lesson observations, drop ins, learning walks, book and planning monitoring
- Positive Attitudes to Learning – children engaged and inspired by their learning, posing own enquiry questions, taking initiative
- Respect – visibly demonstrated through their school environment, their work, interactions-

A mathematical concept or skill has been *mastered* when a child can show it in multiple ways, using the mathematical language to explain their ideas, and can independently apply the concept to new problems in unfamiliar situations.

These will be assessed through: assessment, tracking, pupil progress meetings, performance management, moderation and standardisation.

Arithmetic

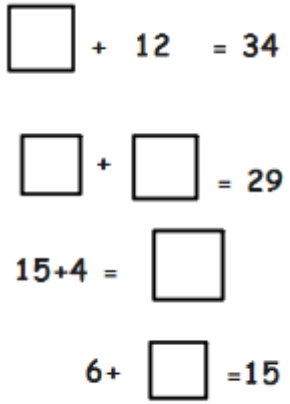
In order to strengthen children's understanding of the basics of mathematics there is a focus in the new curriculum on Arithmetic. In order to develop children's skill, each mathematics lesson will include a daily speedy calculations session.

At the beginning of each maths lesson the children will have a number of calculations to solve within a limited time (see coverage in the table below).

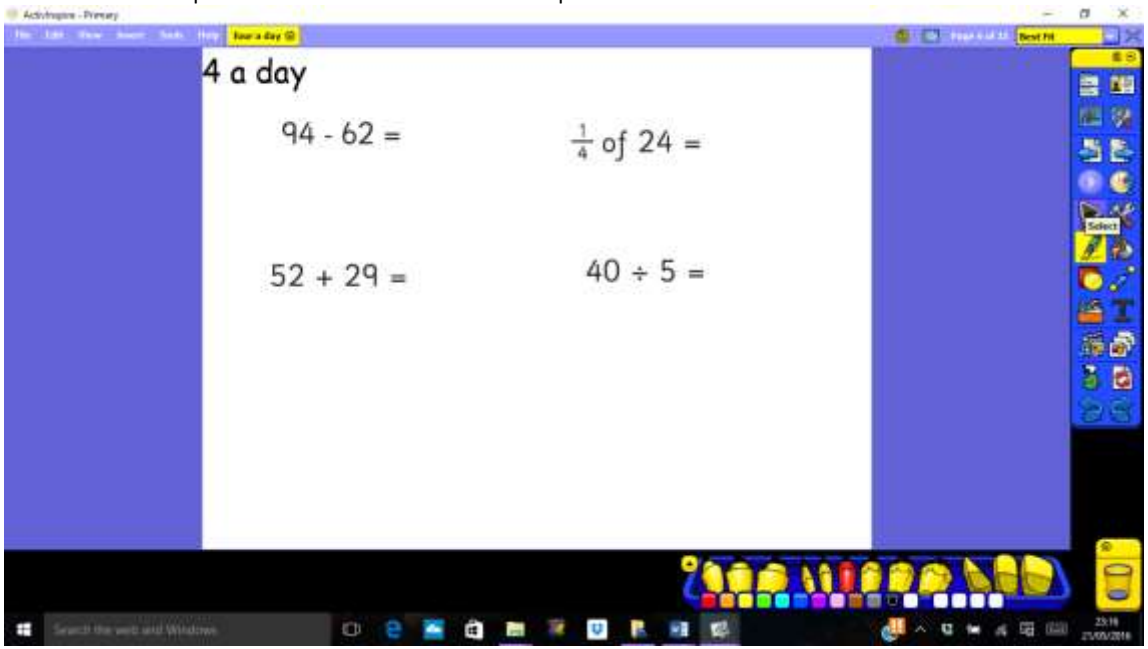
Class	Calculations per day	Addition	Subtraction	Multiplication	Division
Reception	2 a day (on whiteboards) Begin with 3 minutes initially and reduce	• Two single digit numbers	• Two single digit numbers	• Double numbers to 10	• Halve numbers to 20
Year 1	3 -4 a day 1 minute per question	• Two 1-digit numbers • 1-digit number to a 2-digit number (to 20) • Three 1-digit numbers (totalling no more than 20)	• Two 1-digit numbers • 1-digit number from a 2-digit number (to 20)	• Double numbers to 10 •	• Halve a quantity under 20 • Quarter of a quantity
Year 2	4- 5 a day 1 minute per question	• 2- digit to 1-digit • 2-digit and a multiple of 10 • Add 3 1-digit numbers • Two 2-digit numbers • Inverse calculation for missing numbers	• 1-digt from 2 digit • Subtract multiple of 10 from 2-digit number • Two 2-digit numbers • Inverse calculation for missing numbers	• Multiply by 2,3,5, 10 and 0 • 2-digit number by single digit	• 2-digit number by single digit • Halves of quantity • Quarters of quantity • ¾ of quantity • 1/3 of quantity
Year 3	5 – 6 a day 1 minute per question	• Add two 2-digit or 3-digit • Add any combinations of 2-digit and 3-digit • Two fractions with the same denominator	• Subtract two 2-digit or 3-digit • Subtract any combinations of 2-digit and 3-digit • Two fractions with the same denominator	• Multiply by 2,3,4, 5,8 10 and 0 • 2-digit number by single digit	• divide by 2,3,4, 5,8 and 10 • Fractions of a quantity
Year 4	6 a day 1 minute per question	• Add two 2-digit,3-digit or 4 digit numbers • Add any combinations of 2-digit,3-digit or 4 digit numbers • Two fractions with the same denominator beyond 1	• Subtract two 2-digit,3-digit or 4 digit numbers • Subtract any combinations of 2-digit,3-digit or 4 digit numbers • Two fractions with the same denominator	• Multiply by 0,1,2,3,4,5,6,7,8,9,10,11 and 12 • 2-digit and 3-digit numbers by single digit • • 3 numbers	• divide by 2,3,4,5,6,7,8,9,10,11 and 12 • divide 2- digit and 3-digit numbers • divide 1 and 2-digit numbers by 10 and 100 giving the answer as a decimal • fractions of a quantity

Year 5	6 a day 1 minute per question	• Add 2 numbers with more than 4 digits • More than 2 numbers • Add any combinations of 2-digit,3-digit or 4 digit numbers • Fractions with different denominators • Add numbers with up to 3 decimal places	• 2 numbers with more than 4 digits • Add any combinations of 2-digit,3-digit or 4 digit numbers • Fractions with different denominators • Subtract numbers with up to 3 decimal places	• Multiples of any number including decimals • Square and cube numbers • Multiply by fractions	• Divide any number including decimals • Find percentage of number • Fraction of a number
Year 6	6 a day 1 minute per question	• combinations of up to 8-digit numbers • Negative numbers • Fractions with different denominators • Two mixed numbers **Note: children will also complete arithmetic questions of 2 steps e.g. addition followed by multiplication**	• combinations of up to 8-digit numbers • Negative numbers • Fractions with different denominators • Two mixed numbers • Decimals •	• Multiples of any number including decimals and fractions • 4-digit number by 2 digit • Whole number by a fraction • Multiply by a decimal or fraction (including mixed) • Square and cube numbers • 2 simple fractions • 2 mixed fractions • Decimal fractions by 10, 100, 1000 • Decimal fraction with up to 2 decimal places by a single or 2-digitnumber	• 4-digit number by 2 digit • Proper fraction by a whole number • Decimal fractions by 10, 100, 1000 • Decimal fraction with up to 2 decimal places by a single or 2-digitnumber • Percentage of a number

- At the end of Key stage 1 (KS1 SATs) children must answer 25 arithmetic questions within 20 minutes this is 48 seconds per question. At the end of Key stage 2 (KS2 SATs) children must complete 36 questions within 30 minutes this is 50 seconds per question. We will allow one minute per question (5 questions = 5 minutes to complete)
- Children will put a title under their objective e.g. 5 a day
- Children must also have experience of interacting with questions with missing values and calculations must be varied to ensure that = is taught to show equalities.
- At the end of the time period to complete them, teachers will model how to solve them using the most efficient method (this needs emphasis as children may know several different strategies) Children will self-mark these and correct as necessary.
- Children will self-mark these and correct as necessary.



Please see an example of how this is set out on active inspire



It is crucial that children develop quick recall of multiplication facts and that all children know their times tables to 12x12 by the end of Year 4. To this end, children receive times tables practice (both as part of the mental/oral work in lessons and during afternoon registration) as well as a weekly times tables homework. Children are tested on their times tables every week and their achievement is tracked on the 'Times Tables Record of Achievement' displayed in every classroom. Children also learn the related division facts. Children's progress and achievements are celebrated in assemblies and are regularly monitored by the Maths Leader to ensure all children are making progress.

Number facts weekly homework

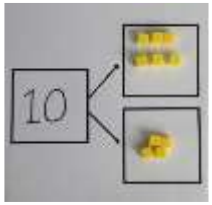
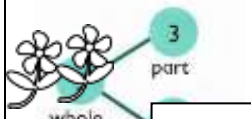
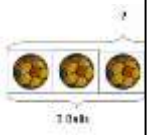
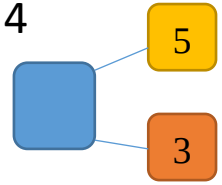
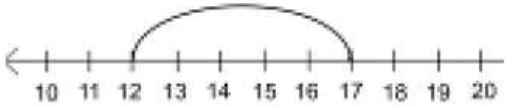
The following is an overview of all to be completed over the course of an academic year. These will be tested weekly like spelling tests and will be given in addition to regular homework. Each academic year should begin with a test based on facts from the previous year's learning; any gaps in learning should be addressed in intervention. If a child makes an error or gets answers wrong in ks1 or 2 , they should stay in to write them out again 3 times each.

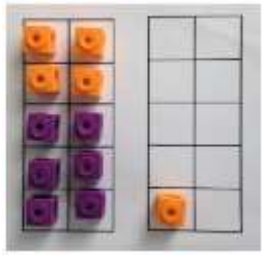
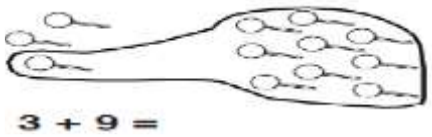
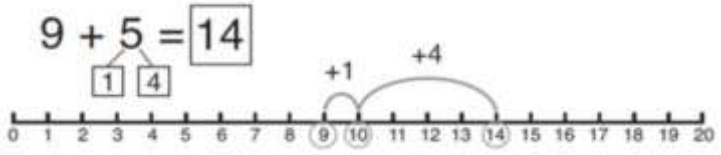
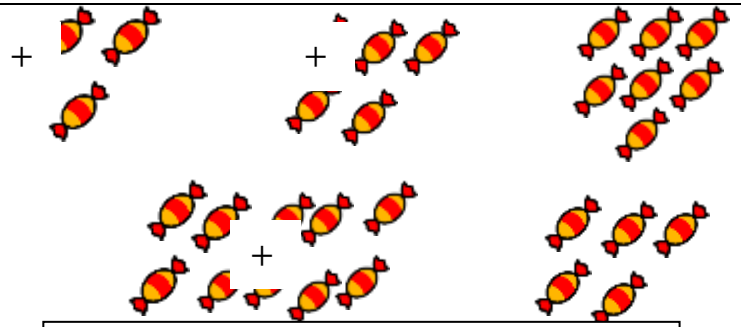
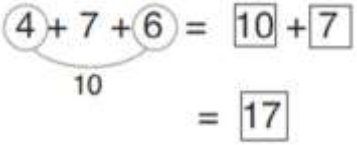
Assessment for learning

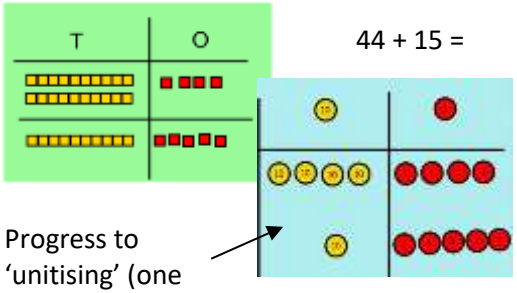
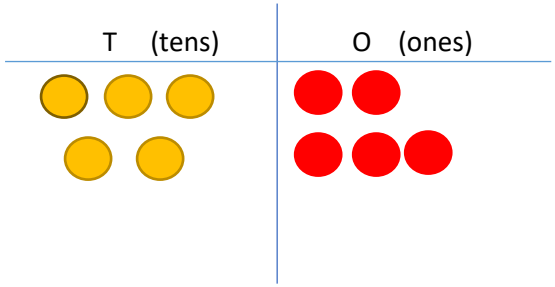
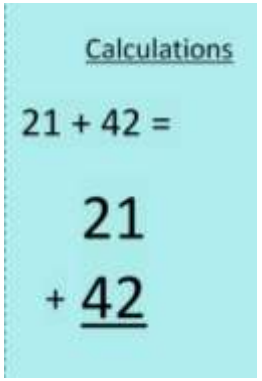
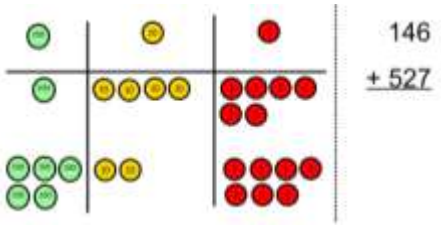
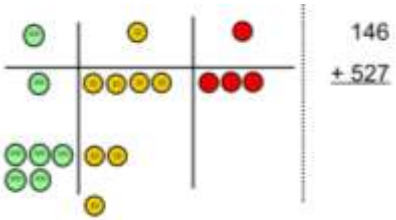
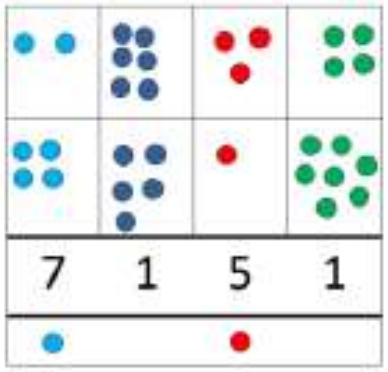
Year	Autumn term focus	Spring term focus	Summer term focus
Nursery **Assessment through play against Early Years' Outcomes**	Counting songs Counting to 5	Representing number using fingers or marks	Counting numbers to 10 in order. Matching quantity to numbers to 10.
Reception **Assessment through play against ELG**	Count and order numbers to 20. +/-1 +/-2 +/- 3 +/-5	Use quantities or objects to add or subtract 2 single digit numbers and count on or back to find the answer. +/-4 +/-5 +/- 6 +/- 7 +/-9	Double numbers to ten. Halve numbers to 20
Year 1 **Times tables to be mixed up 6 per week (the same multiple)**	Read and write numbers from 1 to 20 in numerals and words 5 per week (4 weeks) Read and write numbers to 100 in numerals.	Ten times tables Five times tables	Two times tables
Year 2 **Times tables to be mixed up 6 per week (the same multiple)**	read and write all numbers to at least 100 in numerals and words 5 per week (6 weeks) Four times tables 6 per week	Eight times tables	Three times tables
Year 3 **Times tables to be mixed up 6 per week (the same multiple)**	Six times tables	Nine times tables	Seven times tables
Year 4 **Times tables/Number facts to be mixed up 6 per week (the same multiple)**	Eleven times tables	Twelve times tables	Square numbers relating to 1-144
Year 5 **Number facts to be mixed up 6 per week.**	Prime numbers to 100	All factors of numbers to 100	Square and cubed root of numbers
Year 6	Year 6 are to reinforce and revise number facts		

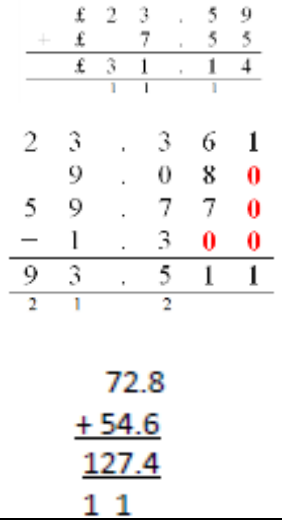
Progression in Calculations

Addition

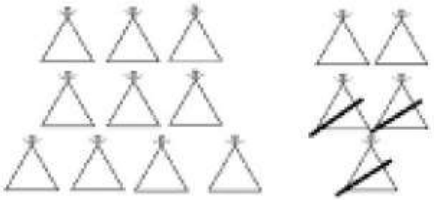
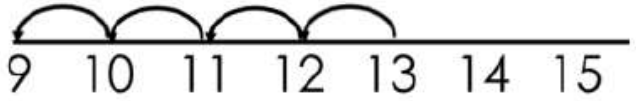
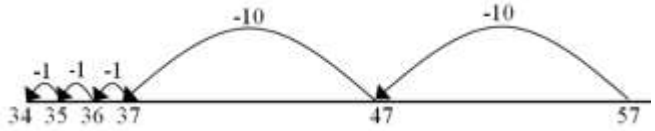
Objective and Strategies	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-part-whole model	   Use cubes to add two numbers together as a group or in a bar. 	  Use pictures to add two numbers together as a group or in a bar. Ensure that the 'whole' is a variety of numbers and that you explore the many different 'parts' of the whole. 	4 + 3 = 7 10= 6 + 4  Use the part-part whole diagram as shown above to move into the abstract.
Starting at the bigger number and counting on	 Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.	12 + 5 = 17  Start at the larger number on the number line and count on in ones or in one jump to find the answer.	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer. Explore the commutative nature of addition (adding can be done in any order – tell Maths stories to demonstrate this and ask them to represent this in journal entries).

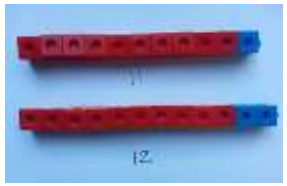
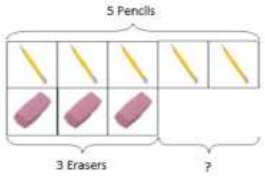
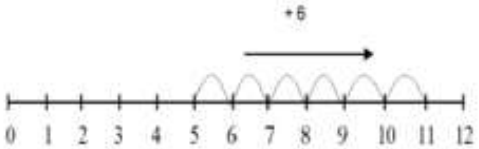
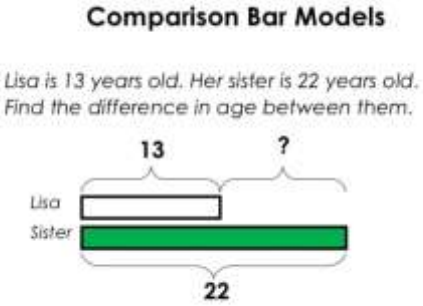
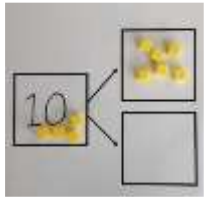
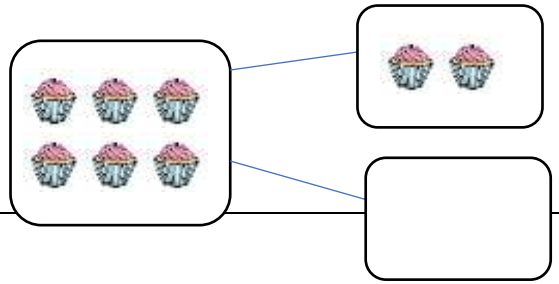
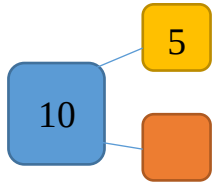
Regrouping to make 10.	 6 + 5 = 11  Start with the bigger number and use the smaller number to make 10. (6 + 5 = 6 + 4 + 1 = 11)	 3 + 9 = Use pictures or a number line. Regroup or partition the smaller number to make 10. 	7 + 4= 11 If I am at seven, how many more do I need to make 10? How many more do I add on now? Use empty box problems e.g. 7 + ☐ = 10 6 + ☐ + 1 = 10 10 = 4 + 3 + ☐ This method should be used whenever mental strategies for larger numbers are appropriate e.g. 74 + 8 =
Adding three single digits	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7.  Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	 Add together three groups of objects. Draw a picture to recombine the groups to make 10.	 Combine the two numbers that make 10 and then add on the remainder.

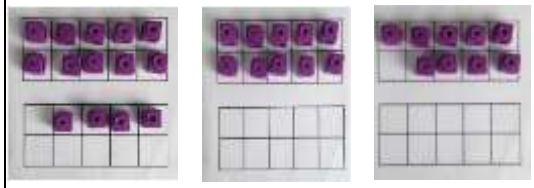
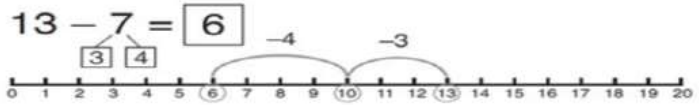
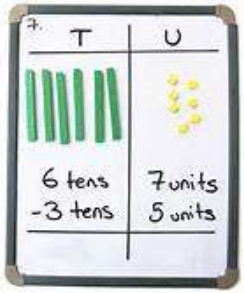
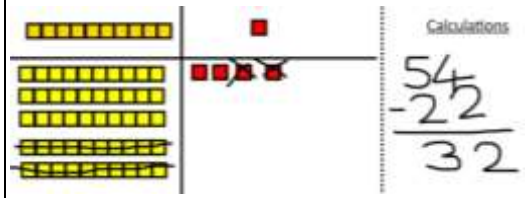
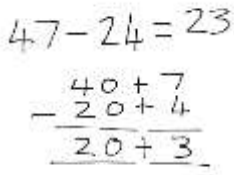
Column method- no regrouping	24 + 15= Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.  44 + 15 = Progress to 'unitising' (one yellow counter here represents 10 and one red counter represents 1)	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. Children could represent a 'number story' in a journal entry / or write a 'number story' about a calculation: 32 + 23 =  	
Column method- regrouping	Make both numbers on a place value grid.  Add up the units and exchange 10 ones for one 10.  Add up the rest of the columns, exchanging the 10 counters from one column for the	Children can draw a pictorial representations of the columns and place value counters to further support their learning and understanding. 2634 + 4517 =  	Start by partitioning the numbers before moving on to clearly show the exchange below the addition. 20 + 5 40 + 8 60 + 13 = 73 536 + 85 621 1 1 As the children move on, introduce decimals with the

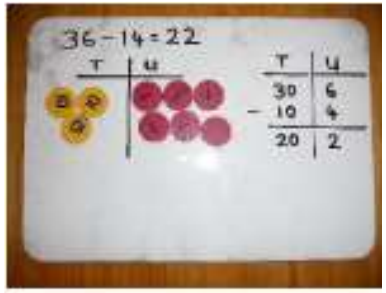
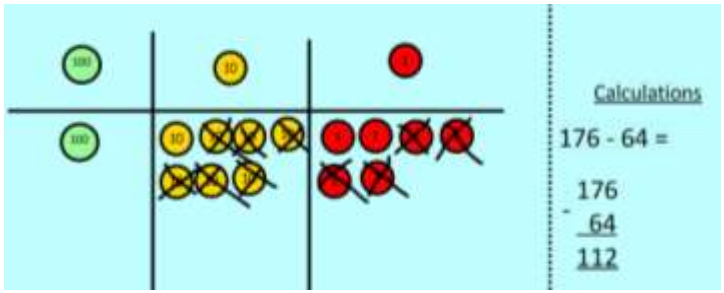
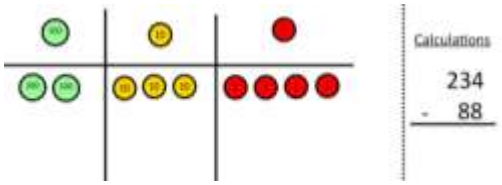
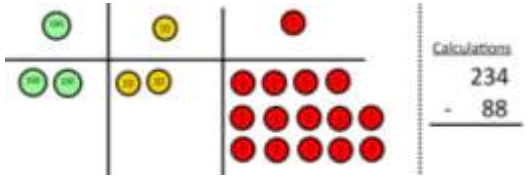
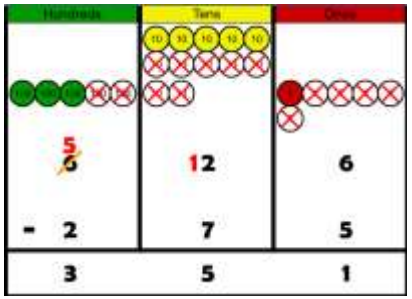
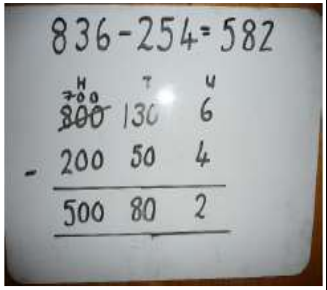
	next place value column until every column has been added. This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100. As children move on to decimals, money and decimal place value counters can be used to support learning.		same number of decimal places first. Then progress to different number of decimal places. Money can be used. Encourage pupils to 'think of decimals, think of money'. 

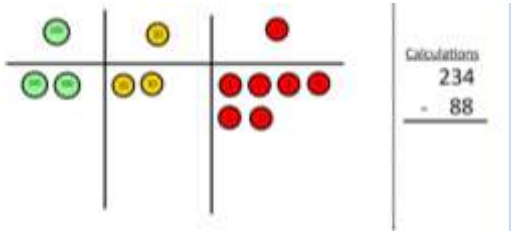
Subtraction

Objective and Strategies	Concrete	Pictorial	Abstract
Taking away ones	Use physical objects, counters, cubes etc to show how objects can be taken away.  – 2 = 4   Ensure that pupils are told 'stories' about the subtraction and that they tell stories about what is represented.	Cross out drawn objects to show what has been taken away.  15 – 3 = 12	18 - 3= 15 24 – 3 = 21
Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13 – 4  Use counters and move them away from the group as you take them away counting backwards as you go.	Count back on a number line or number track 13 – 4 =  9 10 11 12 13 14 15 Start at the bigger number and count back the smaller number showing the jumps on the number line. 57 – 23 =  -10 -10 -1 -1 -1 34 35 36 37 47 57	Put 13 in your head, count back 4. What number are you at? 14 - ☐ = 11

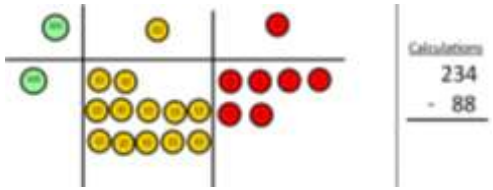
		This can progress all the way to counting back using two 2 digit numbers.	
Find the difference	Compare amounts and objects to find the difference.  Use cubes to build towers or make bars to find the difference  Use basic bar models with items to find the difference Show the bars in different orientations.	 Count on to find the difference. Use this method to find the difference between negative / positive numbers, time, money and other measures. Draw bars to find the difference between 2 numbers.  	Find the difference between 28 and 47. Hannah has 23 sandwiches and Helen has 15 sandwiches. Find the difference between the number of sandwiches.
Part-Part-Whole Model	 Link to addition - use the part-whole model to help explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts. What is the other part?	Use a pictorial representation of objects to show the part-part-whole model. 	

	10-6 =		Move to using numbers within the part whole model. Use knowledge of numbers to 10 to partition numbers to hundreds etc.
Make 10	14 – 9 =  Make 14 on the tens frame. Take away the four first to make 10 and then take away one more so you have taken away 5. You are left with the answer of 9.	 Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.	16 – 8= How many do we take off to reach the next 10? How many do we have left to take off?
Column method without regrouping	 Use Base 10 to make the bigger number then take the smaller number away.	 Draw the Base 10 or place value counters alongside the written calculation to help to show working.	 This will lead to a clear written column subtraction. 7 8 - 3 4 _____

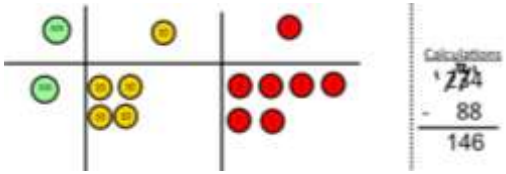
	 Show how you partition numbers to subtract. Again make the larger number first.	Progress to 'unitising' with place value counters: 	4 4
Column method with regrouping	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges. Make the larger number with the place value counters  Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.  Now I can subtract my ones.	 626 – 275 = Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make (this example represents the stage where the exchange and crossing out have already taken place). When confident, children can find their own way to record the exchange/regrouping. Ensure that they can explain WHY the stages are taking place. .	Children can start their formal written method by partitioning the number into clear place value columns. 



Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.

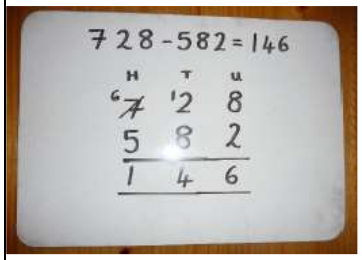


Now I can take away eight tens and complete my subtraction



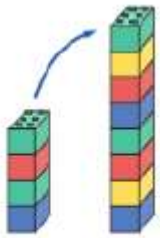
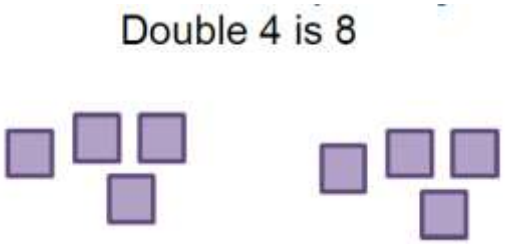
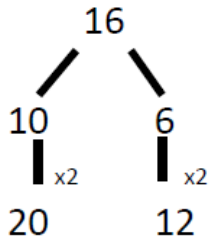
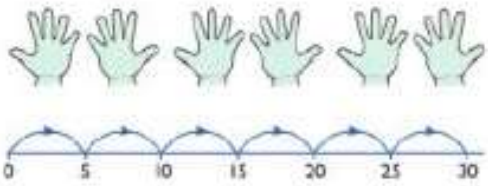
Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.

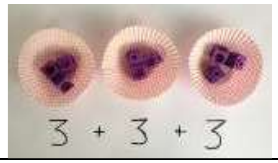
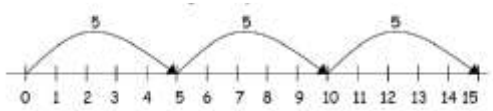
Moving forward the children use a more compact method.

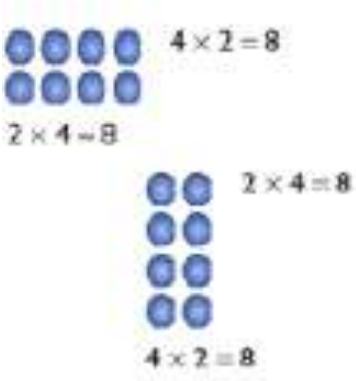
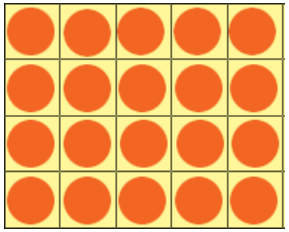


This will lead to an understanding of subtracting any number including decimals. Ensure that place value language is used during this process.

Multiplication

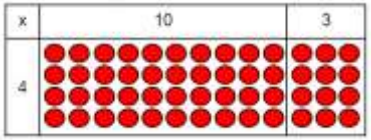
Objective and Strategies	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number.  	Draw pictures to show how to double a number.  	 Partition a number and then double each part before recombining it back together.
Counting in multiples	  Count in multiples supported by concrete objects in equal groups.	 Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30

Repeated addition	   Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?  2 add 2 add 2 equals 6  5 + 5 + 5 = 15	Write addition sentences to describe objects and pictures.  Encourage children to represent various multiplications in journal entries.

Arrays- showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences. Introduce the language of 'groups of'.   Link arrays to area of rectangles.	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15 Progress to the distributive properties of multiplication i.e. 5 x 3 = (3 x 3) + (2 x 3) 3 2

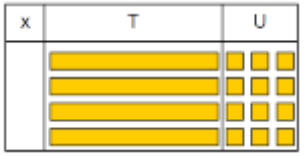
Grid Method

Show the link with arrays to first introduce the grid method.



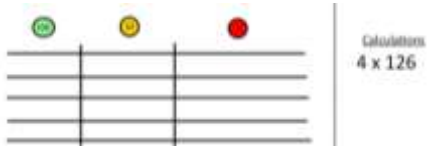
4 rows of 10
4 rows of 3

Move on to using Base 10 to move towards a more compact method.

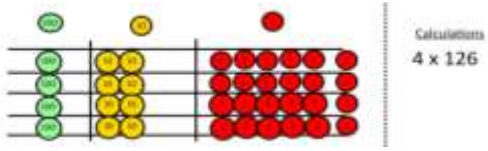


4 rows of 13

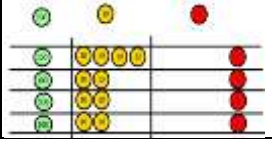
Move on to place value counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.



Fill each row with 126.

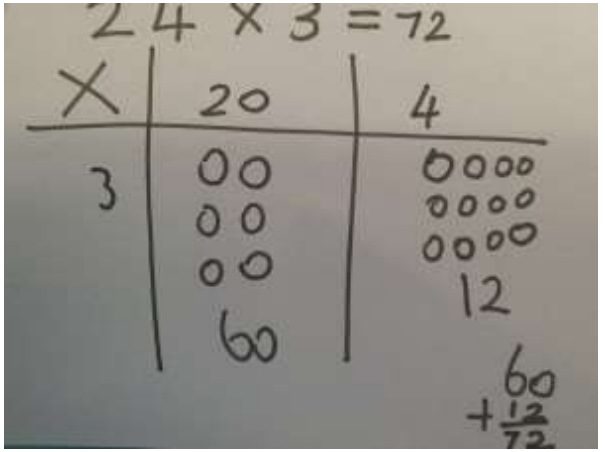


Add up each column, starting with the ones making any exchanges needed.



Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.



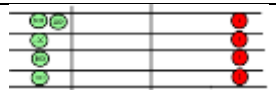
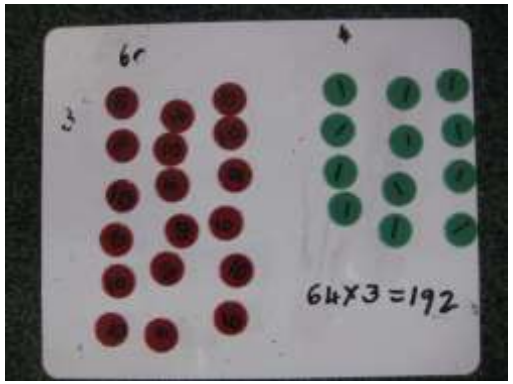
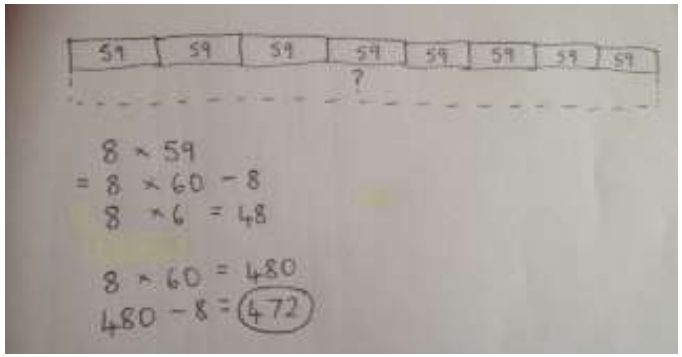
Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

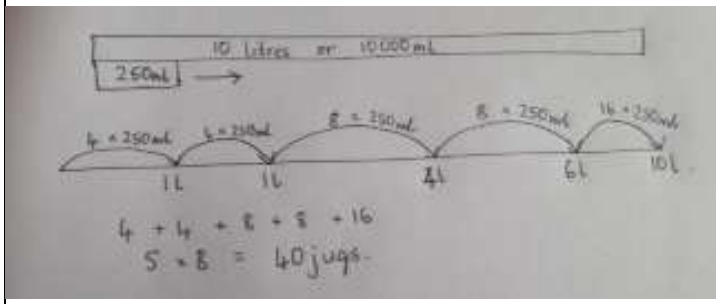
×	30	5
7	210	35

210 + 35 = 245

Moving forward, multiply by a 2 digit number showing the different rows within the grid method, then add the values. When adding, ensure that columns are correctly aligned to avoid miscalculation. Mental methods for addition should be used as far as possible (i.e. mentally add 10000, 8000 and 3000 before representing the column addition).

	10	8
10	100	80
3	30	24

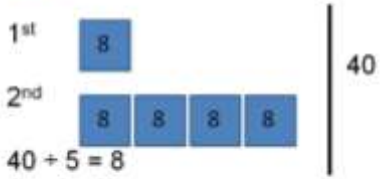
	 Then you have your answer.		X | 1000 | 300 | 40 | 2 10 | 10000 | 3000 | 400 | 20 8 | 8000 | 2400 | 320 | 16
Column multiplication	Children can continue to be supported by place value counters at the stage of multiplication.  It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.  	Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer. 32 x 24 8 (4 x 2) 120 (4 x 30) 40 (20 x 2) 600 (20 x 30) 768



Introduce bars in the context of problem solving for multiplicative structures e.g.

•He posts four times as many second class letters as first.

•How many of each class of letter does he post?



40 ÷ 5 = 8

8 x 4 = 32

1st Class 8 letters

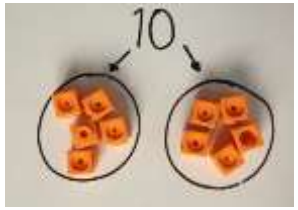
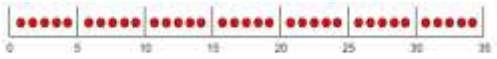
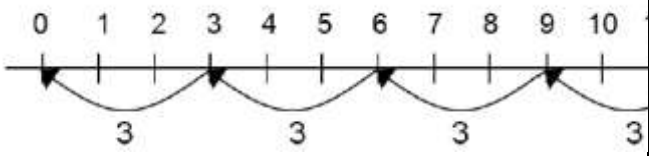
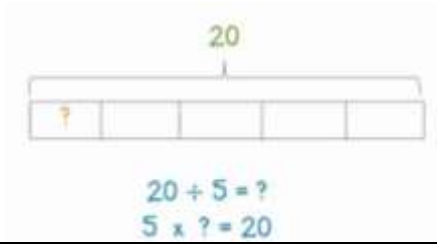
2nd Class 32 letters

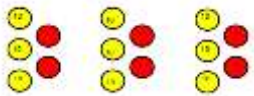
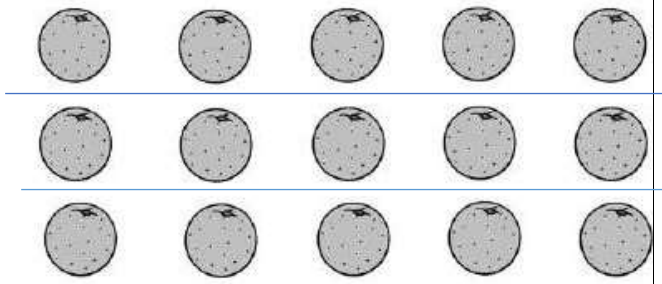
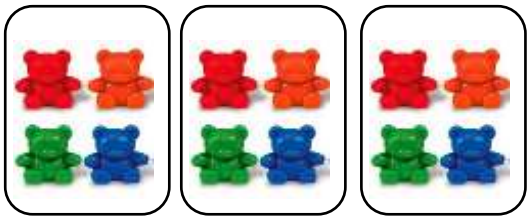
```
      7 4
    x   6 3
  -------
      1 2
    2 1 0
    2 4 0
+ 4 2 0 0
  -------
  4 6 6 2
```

This moves to the more compact method.
Ensure that they clearly understand WHY the '0' is placed in the second row.

```
   1 3 4 2
X     1 8
  ----------
  1 0 7 3 6
  1 3 4 2 0
  ----------
  2 4 1 5 6
```

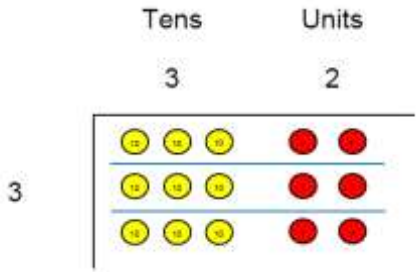
Division

Objective and Strategies	Concrete	Pictorial	Abstract
Sharing objects into groups	 I have 10 cubes, can you share them equally in 2 groups? 	Children use pictures or shapes to share quantities.  $8 \div 2 = 4$	Share 9 buns between three people. $9 \div 3 = 3$
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.   	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. 	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

	96 ÷ 3 = 32 		
Division within arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7
Division with a remainder	14 ÷ 3 = Divide objects between groups and see how much is left over 	Jump forward in equal jumps on a number line then see how many more you need to jump to find a  remainder.	Complete written divisions and show the remainder using r. 

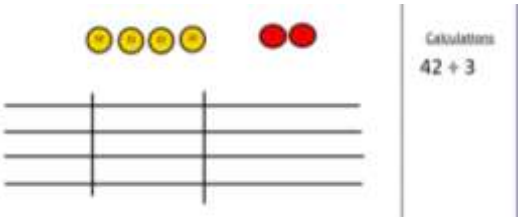
		Draw dots and group them to divide an amount and clearly show a remainder. 	

Short division



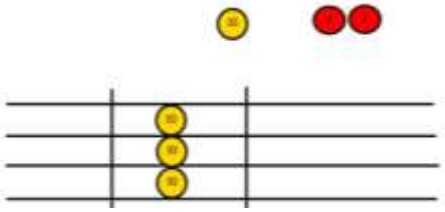
(96 divided by 3)

Use place value counters to divide using the bus stop method alongside

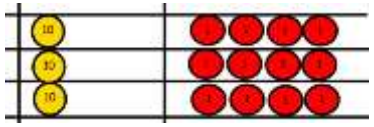


42 ÷ 3=

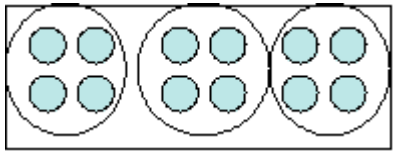
Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.



We exchange this ten for ten ones and then share the ones equally among the groups.



Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.



Encourage them to move towards counting in multiples to divide more efficiently.

Begin with divisions that divide equally with no remainder.

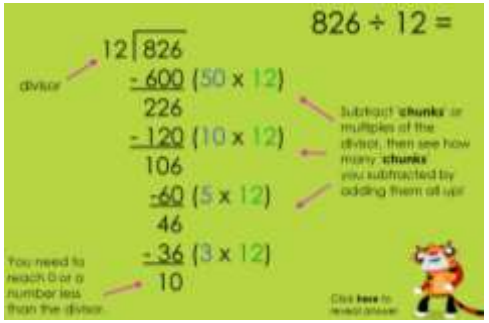
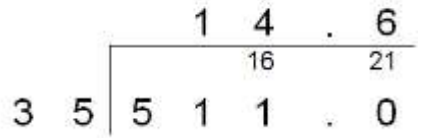
$$\begin{array}{r} 218 \\ 4\overline{)872} \end{array}$$

Move onto divisions with a remainder

$$\begin{array}{r} 86\ r\ 2 \\ 5\overline{)432} \end{array}$$

Finally move into decimal places to divide the total accurately.

$$\begin{array}{r} 215.25 \\ 4\overline{)86\,{}^{2}1.{}^{1}0\,{}^{2}0} \end{array}$$

	We look how much in 1 group so the answer is 14.		When dividing by 2 digit divisors, children should use method of chunking e.g.  ***Remainders*** Quotients should eventually be expressed as fractions or decimal fractions e.g. 61 ÷ 4 = 15 ¼ or 15.25 Progress to the more formal compact bus stop method: 

Cross Curricular Links

Mathematics is an integral part of our daily lives and therefore manifests itself in many areas of the curriculum. Links with ICT are continually developed through use of laptops and appropriate software.

Equal Opportunities/More Able Pupils/Special Educational Needs/EAL

All children at Nursery Hill Primary will have access to Mathematics teaching and resources regardless of gender, race or cultural background. Through monitoring and assessment, teachers will identify the needs of particular children and amend their planning to meet those needs.

Close links with the school's SEN leader will ensure that any specific needs requiring specialist resources are addressed promptly. Children with general learning difficulties will be given the opportunity to use carefully selected programmes.

In Mathematics lessons, children with learning difficulties will be supported in a number of ways:

- Through targeted support by class teacher or TA;
- Through peer group support, paired with higher-achieving children or in small groups;
- Children with more specific needs may be withdrawn to work individually or in small groups at a classroom computer with a TA.

All relevant staff will be responsible for monitoring and recording any information relating to action plans for SEN pupils.

Pupils with EAL will be included in similar ways to those highlighted above; including, where available, the use of bilingual staff to support their understanding and develop their spoken English skills.

Rapid grasping pupils will be stretched through challenging questioning focussing on greater depth, as well as having the opportunity to extend and develop their maths skills through applying them to rich and sophisticated problems across the curriculum and in different contexts.

Assessment, Recording and Reporting

To develop learning, pupils are continuously assessed using a variety of strategies e.g. observation, questioning and marking in accordance with our school feedback policy including the use of Classroom Monitor Tools. In Reception, pupils will be assessed and the Foundation profile completed throughout the year. In KS1 and KS2 children are assessed as either working towards, expected or at greater depth. Data is then used to inform future planning and provision, and to identify children for intervention and support. The Class Teacher, Maths Leader, SEN Leader and the SLT keep records of assessments. Summative end-of-term assessments will take place using tests that are in line with the expectations of the 2014 curriculum.

These will link to the learning objectives for their year group and allow the children to understand their next steps in learning. Statutory Assessment Tasks (SATs) will be administered in accordance with the DfE at the end of KS1 and KS2. An Annual Report is sent to parents towards the end of the Summer Term. These reports cover progress and achievement in Mathematics, set targets for future improvement and include the level achieved in the SATs if appropriate.

Class teachers will be responsible for annually reporting to parents on their children's progress in Mathematics. The Maths Leader will be responsible for monitoring these processes and addressing the training/professional development needs of staff. The Maths Leader will also be responsible for collecting and collating data in order to report standards to parents, governors and the LA as required.

Updated July 2021
E.Karwowski
Maths Lead