Maths Policy 2022

Responsibility: J.Wickham   Date: April 2022

Signed and Adopted by the Governing Body:

Chair of Governors

Date: 16.05.22

To be reviewed: May 2024

INTRODUCTION

This document is a statement of principles, aims and strategies for the teaching of Numeracy/Mathematics at Villa Real School.

The development of Mathematics is seen as a crucial core entitlement for all pupils and students within Villa Real School, from 2 – 19 years.

The core aims for teaching Mathematics at Villa Real are in line with the 3 main aims of the National Curriculum to ensure children:
- Become **fluent** in the fundamentals of Mathematics
- **Reason Mathematically**
- Can **solve problems** by applying their mathematic skills to a variety of routine and non-routine problems.

Villa Real has adopted the **Mastery Approach** to teaching Mathematics. The essential idea behind mastery is that 'all pupils need a deep understanding of mathematics so that:
- Future mathematics learning is built on solid foundations which do not need to be re taught
- Teaching is focussed, rigorous and thorough to ensure learning is embedded and sustainable over time.
- Challenge is provided by deeper learning rather than speeding through the curriculum
- Build on their awareness of events and actions and recognise changes in pattern, quantity and space that occur in their lives, both the immediate environment and in the wider world
- Use their developing awareness to anticipate and predict changes
- Use their awareness and developing understanding of pattern, space, shape and number, to develop problem-solving skills that contribute to making choices, taking decisions and gaining control over their immediate environment
- Extend mathematical skills, experiences and understanding which enable them to visualise, compare and estimate. For 'more able' pupils this may be achieved in abstract as well as concrete contexts
- Begin to think about the strategies they use and explain them to others
- Develop a powerful set of thinking tools to help them increase their knowledge and understanding of the world and, during the school years, to learn effectively in different subjects across the curriculum

AIMS

The overarching aim for Mathematics at Villa Real School is to promote high standards of numeracy by equipping pupils with the very best knowledge and understanding so they can make sense of the world by developing their ability to calculate, to reason and to solve problems. It enables pupils/students to understand and appreciate relationships and pattern in both number and space and in their everyday lives.

Our ambitious Mathematics curriculum is progressive and sequenced, building on prior knowledge whilst learners revisit and recall prior vocabulary, skills and understanding. Component knowledge is built on so composite knowledge is acquired. Mathematical vocabulary is taught, revisited and memorised.

Numeracy or Mathematics lessons aim to encourage all learners from EYFS to Key Stage 5 to develop mathematical skills so they can:

- Become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils/students develop conceptual understanding and the ability to recall automatically and apply knowledge accurately
- Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- Solve problems by applying their mathematics to a variety of routine and non-routine problems, including breaking down problems into a series of simpler steps and persevering in seeking solutions

These skills are integral to the development of our learners Mathematics or Numeracy however also factor heavily across all areas of the whole school curriculum.

We aim to develop the learners' love of Mathematics/Numeracy by creating engaging fun experiences, which build self-confidence and independence. The School believes that the aim of the Numeracy/Mathematics curriculum is to enable each learner to develop their full potential. Mathematics teaches us how to make sense of the world around us by developing a child's ability to calculate, to reason and to solve problems. It enables children to understand and appreciate relationships and pattern in both number and space in their everyday lives.

Through an embedded **CPA Approach** (concrete, pictorial, abstract) to the modelling of new concepts, we aim to increase confidence in mathematics, enabling all pupils to achieve regardless of their starting points. We aim to develop good understanding of numbers and the number system, whilst teaching pupils to apply this knowledge through problem solving and real-life activities. The teaching of mathematics should include the use of manipulatives, particularly Numicon and real life objects, to develop reasoning skills and opportunities to use specific mathematical vocabulary and a culture of enthusiasm and wonder while developing a love of the subject.

Opportunities to develop the ability to reason and problem solving should be evident through planning and teaching, exploring links between core arithmetic skills. Children should be encouraged to make connections between mathematics as well as other subject areas such as Science, Geography, Design Technology and Outdoor Learning.

The Villa Real Calculation Policy supports the development of learners as well as supporting the professional development of school staff.

SCOPE

This policy applies equally to all learners in the school, with full consideration being given to each individual's specific needs in relation to the development of Numeracy/Mathematics.

As part of that process, advice and guidance is sought, where appropriate, from other professionals working in school – including speech and language therapists, occupational therapists, physiotherapists, educational psychologists and teachers specialising in the education of pupils and students with multiple disabilities and multisensory impairment or complex and multiple learning difficulties. Teaching staff expertise is also shared and relevant training is undertaken and disseminated to other staff.

PURPOSE OF STUDY

Mathematics is an interconnected subject through which pupils need to be able to move fluently. This includes between key mathematical concepts as well as a range of representations of mathematical ideas. The programmes of study are split into specific strands of mathematics in order to teach clear concepts but definite connections across all mathematical ideas must be made.

ENTITLEMENT

Our ambitious curriculum begins in EYFS where pupils follow the Villa Real Early Years Framework. Numeracy is taught in Key Stage One and until the end of Key Stage 2 and then Mathematics in Key Stages 3,4 and 5. The curriculum is mapped and sequenced across the whole school, through the different mathematical strands which are:

- Number – place value, addition, subtraction, multiplication, division and fractions
- Geometry – 2D and 3D shape, position and direction
- Measure – length, mass, volume, capacity and time
- Statistics and Probability – data handing (graphs, charts and tables) and probability

Early maths skills are stringently and carefully taught throughout the school, not depending on age, but depending on the development of the learner.

Every class will have Numeracy/Maths every day. Class managers create plans to ensure that opportunities are engaging and developmental for all learners, ensuring individual pupils/students' needs are met, keeping in mind the end of key stage goals set by the school and including any links appropriate with other subject areas.

Sessions are delivered by various members of staff who will have the relevant subject knowledge to support the learners on their learning journey.

All classes follow the White Rose Scheme of Work or Villa Real Sensory Maths Schemes of Work depending on which pathway they are on. These robust and ambitious curriculums are based on the National Curriculum and New Early Years Framework which have been adapted in a bespoke and individualised way. Planning extends beyond the National Curriculum to meet the needs of our pupils/students.

- Pathway 1 – pupils follow the VR EYFS Framework based on the EYFS Statutory Framework
- Pathway 2 – pupils/students follow the VR Mathematics Sensory Scheme of Work based on the National Curriculum, delivered in a multi-sensory way. Assessment may be via the Engagement Model
- Pathway 3 – Pupils/students follow the White Rose Scheme of Work. In Key Stage 1 and 2 the pupils work towards the pre-key stage standards and Nationals Curriculum SAT's. In Key Stages 3,4 and 5 students work towards AQA Entry Level Mathematics. Students who are ready, sit AQA Entry Level 1/2/3 exams when appropriate from year 9 as part of a sequenced personalised curriculum. For those pupils who are ready, preparation work for GCSE Mathematics will be delivered.

Classes follow the school overview to ensure coverage and use different strategies to support their learners. Numicon is used throughout the school to develop the pupils/students understanding of number and place value. All classes will include a number/counting activity daily and develop skills in recall and the comprehension of key vocabulary. The key vocabulary for each area and level of learning is set out the in National Curriculum, the school's Calculation Policy and Schemes of Work.

MORE ABLE
Learners who have been identified as More Able will have specific strategies and interventions appropriately planned by the class manager and overseen by Senior Management to ensure that their specific needs are met.

ORGANISATION

Each class should have a 'working wall' designed, displayed and used depending on the need of the learners in their class. The learning journey for that unit of work should be clearly visible on it. The work on the display should consist of the strand covered and key vocabulary and could include; examples of modelling, prior knowledge, good examples of learning, or links to other areas of the mathematics curriculum.

All classes should teach at least 3 sessions on Numeracy/Mathematics per week. This work should be recorded in books. Daily opportunities for counting, using number or other /numeracy maths skills across the curriculum should be considered when planning and teaching.

The School intends to provide the resources and opportunities for training necessary for teaching and non-teaching staff, maths specialists and non specialists to put the policy into practice.
School based Inset time will be used to:
- Facilitate the standardisation and moderation of assessment and recording procedures
- Share and develop teaching strategies and skills
- Familiarise staff with available teaching resources

Curriculum guidelines will accompany this policy to indicate the means by which the aims are put into effect and the requirements/expectations met.

In the classroom we seek to create a supportive learning environment. We make great use of a variety of age related software, websites, games and real-life materials to engage students and help them learn in the way that best suits their needs with an emphasis on the key skills of Problem Solving.

Perception
- recognising opportunities
- recognising and identifying problems

Thinking
- breaking down a problem into elements
- thinking through the relevant features of a problem
- planning ways to solve a problem

Action
- remembering how to solve a problem

Evaluation
- evaluating how a plan worked
- recognising when existing plans and strategies need changes

PLANNING

Medium Term Plans should be created in the 'Villa Real MTPlan Format' for each term and should include the key outcomes for each pupil/student in the class. Information regarding the learning objectives, key questions, the strands of mathematics covered, the organisation of the coverage, key vocabulary, teaching strategies, manipulatives and assessment plans should

be present and clear. These are working documents so can be altered and re arranged to meet the needs of the pupils. Plans are submitted termly to the Maths Subject Leader, Headteacher and Key Stage Managers to quality assure.

Key vocabulary for teaching Numeracy/Mathematics is not ragged. Due to the vast amount of key vocabulary across all strands, vocabulary is organised in the different units of work either in the Villa Real Sensory Scheme of Work, the White Rose Scheme of Work. These words can then be used to produce the bespoke planning for individuals depending on their development and the small steps of progress being planned and delivered.

Class Teachers can decide on how they wish to organise the curriculum for maths within their classes, depending on what strategy will encourage deeper learning for the needs of the individuals of the class. For example, teachers may choose to block Maths in topics such as Length for 2 weeks, then Addition for 2 weeks etc. Or they may choose to teach a different strand each lesson, for example Measure on a Monday, Calculation on a Tuesday etc. However, each class must cover an element of Number every day and there must be a problem solving activity each week. Reasoning and fluency must be present throughout.

It is the class teacher's responsibility to ensure pupils gain a varied mix of mathematical learning and all the strands are covered within the year.

Formal lessons can consist of a Mental Oral Starter during which the focus should predominantly be on number skills and counting. This should then be followed by focussed input, then independent or supported activities and then a plenary, either whole group or individual, at the end of the lesson. This is a good time to either pre teach for tomorrows learning, carry out an elicitation for next steps or assess understanding from that session. The Teaching Style adapted reflects the School's Teaching and Learning Policy.

<u>ASSESSMENT</u>
Formative assessment must take place throughout all lessons, and tasks should be changed throughout the lesson to meet the needs of the learner in necessary. The marking guidance set out in the Marking Policy must be followed when assessing children's learning through their work. Where misconceptions have occurred, and it is not appropriate to address this within the lesson, an opportunity to revisit the learning must be given. This could be included in the morning work the next day, or provided by a different activity for the following day's lesson.

For those pupils/students accessing Numeracy/Mathematics skills across the Engagement Steps on B Squared. Mathematics progress and assessment in covered within the 'Cognition and Learning' section, mostly under 'Curiosity',

'Investigation' and 'Discovery'. B Squared captures this data to create reports.

For those pupils/students accessing Mathematics skills across the Progression Steps on B Squared. B Squared groups objectives into 'Number', 'Geometry and Measure', and 'Statistics and Probability' to capture data reports.

Teachers assess across all strands in Mathematics, and these must be entered onto B Squared as outlined in the Assessment Policy.

TARGETS

For Mathematics there are two different types of formal targets set for each individual pupil.

End of year targets for Mathematics are set using the data captured on B Squared and set in line with the Assessment Policy.

REAL targets for individual pupils may have a Numeracy/Mathematics linked target set as their 'Learning and Curriculum' target or as part of the 'Employability' section in their Education Health Care Plans.

MONITORING AND EVALUATION

Quality assurance of the teaching and learning of Mathematics will take place through focussed book scrutinies, pupil voice, evaluation of Medium Term Plans, lesson plans, learning walks, and data analysis.

Feedback will be given to staff following any monitoring activity, through written and verbal means, and the opportunity for discussion will always take place. Where an area for development is identified, as a whole school or in a particular class or year group, support will be given by the Maths Subject Leader, member of the MMT or SLT or other specified teacher.

USE OF ICT

Calculators should not be used as a substitute for good written and mental arithmetic. They could be introduced in KS3, 4 or 5 to support pupils' conceptual understanding and exploration of more complex number problems. They may also be used to support reasoning.

Teachers should use their own judgement as to when ICT tools should be used in teaching and learning. It is essential that the use of IT does not take the place of concrete exploration of ideas, using manipulatives or jottings. It

must not be over used in the classroom and it should be carefully considered as the when it supports the children's learning best.

SPOKEN LANGUAGE/ORACY

As cited in the National Curriculum, the importance of spoken language in developing pupils' mathematical understanding is of great importance. Even though verbal communication is an area where many of the pupils at Villa Real are at a disadvantage, the quality and variety of language that the children hear and speak are key factors in developing mathematical vocabulary and an ability to present mathematical justification, argument or proof. Staff must use and introduce the correct mathematical vocabulary, showing how to use the words on their own and to model good examples of reasoning. This appropriate vocabulary must also be available on symbols for PECS, Makaton, Eye gaze software, PODD or any other communication means our pupils require. Pupils must be supported in making their thinking clear to themselves as well as others, and discussion with manipulatives alongside, should always be used to probe and assist in addressing their misconceptions.

Teachers are encouraged to use Maths games and opportunities where learners can communicate with each other to embed learning and revisit and recall previously taught information.

HOMEWORK

Homework is set in accordance with the Homework Policy. Homework should include a variety of activities to support learning.

REMOTE LEARNING

If learning cannot happen on site, class managers will follow the guidance outlined in the Numeracy/Mathematics Remote Learning document.

RESOURCES

Every classroom should be well equipped with a range of core manipulatives. These should be suitable for visually representing known strategies, modelling new concepts and for children to use to support the calculation and verbalising their thinking. Manipulatives and visual representations should be used throughout every lesson to support the children's reasoning skills and ability to justify their theories.

Other manipulatives which are not used as regularly, such as those for measure, are to be centralised and should be put back when they are no longer being used, so that other classes can take advantage of them.

Should a member of staff feel they need more resources, they should check with other classes first, to see if they have any spare, and only if none available should source the resources, fill out an order form from the office and give this to the Maths subject leader.

Each classroom should adopt a culture of positive manipulative use. Pupils should feel positive about using manipulatives to help them and staff should encourage the use of manipulatives when asking children to explain their ideas.

Villa Real uses a variety of published materials to facilitate the teaching of mathematics such as White Rose and Numicon, but recognises the need for the teaching of maths to be 'scheme assisted not scheme driven'.

Written Calculation Policy

2023

Responsibility: Jen Wickham   Date: June 2023

Signed and Adopted by the Governing Body:

Chair of Governors

Date: 29.06.23

Date to be reviewed: May 2024

Calculation Policy

Contents Page

RATIONALE

This Calculation Policy has been written in line with the programmes of study taken from the revised National Curriculum for Mathematics (2014) and is linked to our Mathematics Continuums. It provides guidance on appropriate calculation methods and progression. The content is set out in stages under the following headings: addition, subtraction, multiplication and division. Statements taken directly from the programmes of study are listed in bold at the beginning of each section.

Pupils will, firstly, use mental methods, but for calculations that they cannot do in their heads, they will need to use an efficient written method accurately and with confidence.

When a new concept is introduced there will be a Concrete, Pictoral and then Abstract approach to teaching.

AIMS

- To ensure consistency and progression in the school's approach to calculation
- To ensure that pupils develop an efficient, reliable, formal written method of calculation for all operations
- To ensure that pupils can use these methods accurately with confidence and understanding

HOW TO USE THIS POLICY

- The policy should be used as the basis of planning
- If, at any time, pupils are making significant errors, the previous stage in calculation should be re-visited
- Suitable resources, models, images and methods of communication within a Total Communication environment to support pupils understanding of calculation and place value, as appropriate, should be used
- The policy should be used in conjunction with the Maths Glossary from the NCETM and our Maths Scheme of Work - https://www.ncetm.org.uk/public/files/17308038/
- Staff should also use this document to support their own knowledge, skills and understanding of how to teach mathematics effectively.

Calculation Guidance - Addition Stage 1
'When you add a number, it gets bigger'

- Pupils will engage in a wide variety of songs and rhymes, games and activities. They will begin to relate addition to combining two groups of objects, first by counting all and then by counting on from the largest number. Initially using numbers to 5, then to 10.
- They will find one more than a given number.
- They will combine 2 parts to make a whole.
- Begin to use numerals as labels for numbers.

In practical activities and through discussion they will begin to use the vocabulary involved in addition.

Do not move onto the next stage until this one has been mastered.

Concrete – real things to touch and move	Pictoral	Abstract
Counting aloud	'You have five apples and I have three apples. How many apples altogether	DIGITS -Number only linked to concrete – labelling numbers using the digits
Count and rearrange		

Vocabulary
Add, more, and, make, total, altogether, score, double, one more, makes, is,

Links to Other Strands	Numicon/Number Links
Counting forwards	Pupils should be able to recognise the Numicon plates to 10.
Combining and increase numbers	Name or label the plates using digits
Develop the concept of addition	Put in order from 1 to 10 making the step sequence
Real Life links with verbal number stories	Find a missing numicon shape in the step sequence
	Label the step sequence with digit cards 1 – 10
	Use Numicon when solving addition calculations – placing the shapes together and finding the one that matches to place on top –
	Fitting plates together – step+step, step+non step, non step+non step together

Calculation Guidance – Addition Stage 2
'When you add a number, it gets bigger'

Pupils will continue to engage in a wide variety of songs, rhymes, games and activities.
Given a number, identify one more
- Read, write and interpret mathematical statements involving addition (+) and the equals (=) sign
- Add one- digit and two-digit numbers within 20, including zero
- Solve missing number problems e.g. 10 + = 16

Do not move onto the next stage until this one has been mastered.

Pupils will continue to practise counting on from any number e.g. 'Put five in your head and count on four.'
Initially use a number track to count on for addition, counting on from the largest number:

5 + 4 = 9   'Put your finger on number five. Count on four.'

Then progress to a marked number line:

3 + 3 = 6   'Put your finger on number three and count on three.'
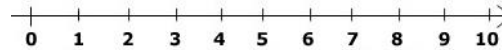
8 + 7 = 15   'Put your finger on number eight and count on seven.'
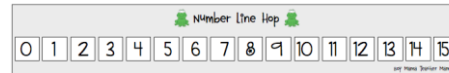
Continue to practise counting on from the largest number for addition with totals within 20.
Use various manipulatives to calculate to 10 initially and then progress up to totals to 20.
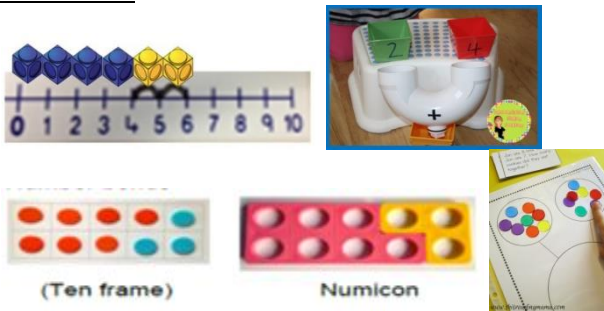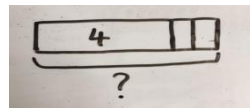
Concrete	Pictoral	Abstract
(Ten frame) Numicon	4 add 2 is 7 is equal to 3 and 4 / 7 is the same as 3 and 4 4 ? Draw the tens frame or other manipulative 6 add 5 is?	What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2 Children to understand equality
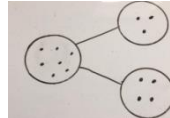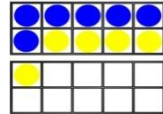
		$6 + \square = 11$
8 + 6 can become or	5 + 2 = 7	$6 + 5 = 5 + \square$
	3 plus 3 makes	$6 + 5 = \square + 4$
		7 8 9 10 11 12 13 14 15 16 9 + 6 =

Vocabulary
Add, more, and, plus, make, total, altogether, score, double, one more

Links to Other Strands	Numicon/Number Links
Combine and increase numbers, counting forwards	Make numberline to 20 and label with numerals
Develop the concept of addition and use operations fluently	Make, recognise, use teen numbers from the two plates (2 digit) tens
Discuss and solve problems in familiar practical contexts	and ones
Compare, discuss and sole practical (measure) problems e.g. longer	Use numicon to add numbers to total no more than 20
than, heavier than, bigger than	Use numcion to find number bonds/pairs to 10 and then link to
	number bonds/pairs to 20

Calculation Guidance – Addition Stage 3
'When you add a number, it gets bigger'

Add numbers using concrete objects, pictorial representations, and mentally, including:
- A two digit number and ones
- A two digit number and tens
- Two two-digit numbers
- Three one-digit numbers

Counting on
- Counting on in ones using an empty number line, within 100
- Counting on in tens using an empty number line, within 100
- Use in conjunction with a 100 square to show jumps of tens

Do not move onto the next stage until this one has been mastered.

Initially begin with addition to 50

Then to 75

Then to 100.

Concrete
TO+O using base 10

TO+O using numicon

25+5=30

2 tens 5 ones + 5 ones
= 3 tens = 30
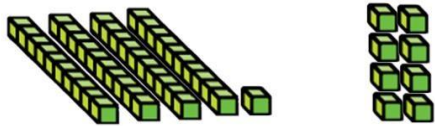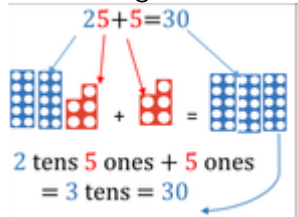
TO + TO using base 10. Continue to develop understanding of partitioning and place value.

36 + 25
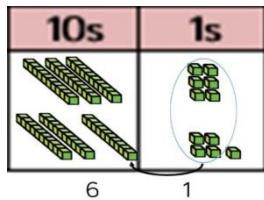
Pictoral
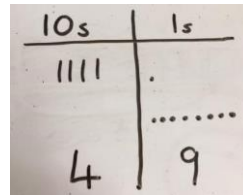
Represent base ten with lines for tens and dots or crosses for ones.
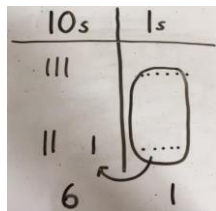
36+25=

Use pictures or a number line. Regroup or partition the smaller number to make 10.

3 + 9 =

Abstract

48 + 36 = 84 'Put the biggest number first (48), and then partition the smaller number (36 = 30 + 6) and count on: 48 + 30 + 6.'

- Use in conjunction with a 100 square to show jumps of tens and ones and something concrete too
- If pupils are confident, use more efficient jumps:

48   78   80   84

- Use in conjunction with a 100 square to show jumps of tens and ones/units and something concrete too

Also use the partitioning method to add two two-digit numbers: 43 + 25 = 68   40
                3   20   5
40 + 20 = 60
3 + 5 = 8
60 + 8 = 68
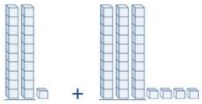
24 + 15=

Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters/ dienes.
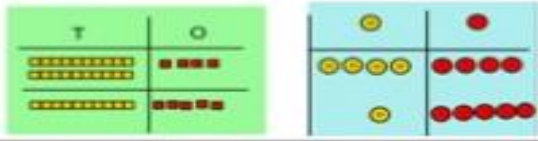
Partition and recombine
46 + 27   =   60 + 13   = 73

4 + 7 + 6= 17
Put 4 and 6 together to make 10. Add on 7.

Number bonds/pairs/combinations to 100

After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.

tens	ones
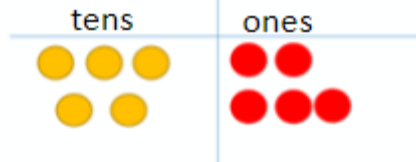
Add together three groups of objects. Draw a picture to recombine the groups to make 10.
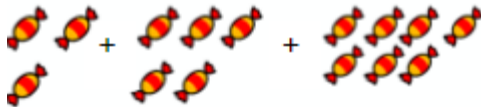
46 + 27 = 73   Count in tens then bridge.

Using a blank number line
(adding on all the tens, bridging through ten)

(34) + 28 =
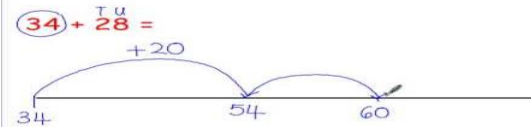
Bar modelling There were 43 sweets in 1 jar and 78 sweets in another, how many were there altogether?

'Partition the numbers into tens and ones.
Add the tens together and then add the ones together.
Recombine to give the answer'.

30 + 4		34
20 + 5		+25
50 + 9		59
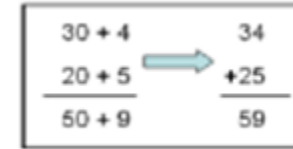
Then move on to calculations that **bridge** the tens:
48 + 36 = 40 + 8 + 30 + 6
            40 + 30 = 70
              8 + 6 = 14
            70 + 14 = 84
            48 + 36 = 84

This is an alternative way of recording the partitioning method.

This will lead into formal written methods in Stage 4.

Further develop addition with numbers that bridge 100, using a **200 grid** to support.

66 + 4 = 100
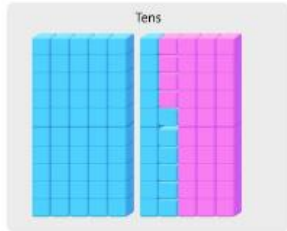
Tens

Promoting Fluency
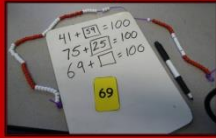
Combinations of 100

26

?

43 | 78
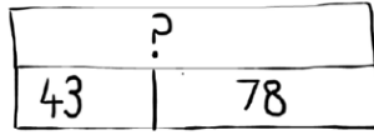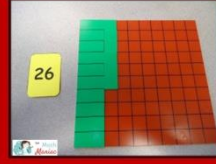
25 + 29 by + 30 then -1
(Round and adjust)
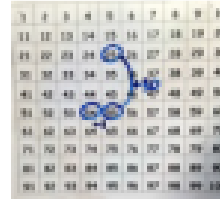
Vocabulary
Add, more, and, plus, make, total, altogether, score, double, one more, tens, ones, place value, worth, column, tens digit, ones digit, digit, 2 digit number (When ready - Three digit number, hundreds digit, hundreds)

Links to Other Strands	Numicon/Number Links
Solve problems using various concrete and pictoral representations Apply increasing knowledge of written methods Partition numbers in different ways Discuss and solve problems that emphasis the value of each digit in 2 digit numbers Counting up in fractions to 10	Making 2 digit numbers with plates then moving onto base 10 as its easier to manipulate as you use bigger numbers. Always start with numicon when modelling a new concept, and then move onto either base ten or place value counters to support visually with more abstract concepts Remember numicon can still be used for problem solving, doubling,

Calculation Policy – Addition Stage 4
'When you add a number, it gets bigger'

- Add numbers mentally including a three digit number and ones, three digit number and tens and three digit number and hundreds
- Add numbers with up to three digits, using formal written method of columnar addition

Concrete

Add 473 + 125
473
125
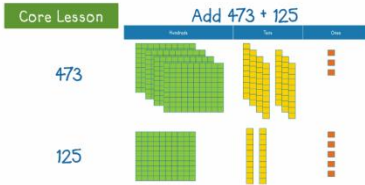
Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.

100s	10s	1s
6	1	1
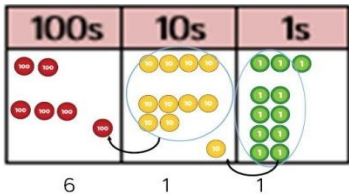
Pictorial

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

| 100s | 10s | 1s |
| 6 | | 1 |
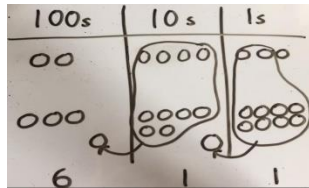
Children to draw the base 10 in a grid to show the concrete equivalent

Bar Modelling to support understanding of language

315	
185	?

$315 - 185 = ?$
$185 + ? = 315$

?	
185	315

$185 + 315 = ?$
$? - 185 = 315$

- Further develop the use of the **empty number line** with calculations that **bridge 100**:

$78 + 46 = 124$ $78 + 40 + 6$
78   118   124

Abstract

Introduce the **expanded written method** with the calculation presented both horizontally and vertically (in columns).
Initially use calculations where it has not been necessary to bridge across the tens or   hundreds:

$63 + 32 = 95$ 60 and 3
                    +30 and 2
                    90 and 5 = 95

This will lead into the   formal written method:

```
 6 3
+3 2
 9 5
```

Use the language of place value to ensure understanding: 'Three add two equals five. Write five in the ones column.   60 add 30 equals 90. Write 9 (90) in the tens column.
Then introduce calculations where it is necessary to bridge:

```
  68
+ 24
  12 (ones)
  80 (tens)
  92
```

Add the least significant digits (ones) together first and then the tens in preparation for the formal written method. Writing the units and tens is not necessary as long as the pupils understand the method.
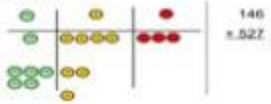
If pupils are ready, introduce the formal written method, where it is necessary to 'carry' ten from the ones to the tens column:
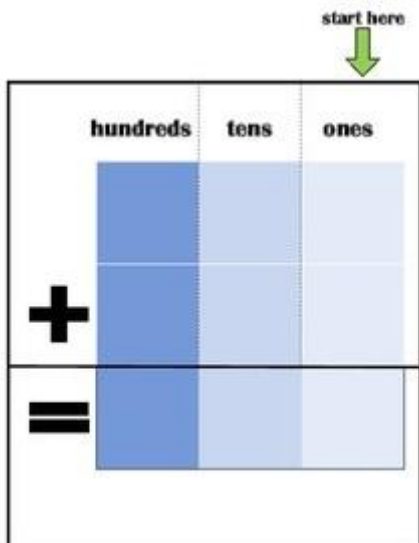
```
  68
+ 24
  92
  1
```

Make both numbers on a place value grid.

146
+ 527
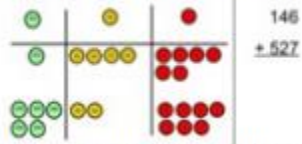
Add up the units and exchange 10 ones for one 10.

146
+ 527

Using a grid like this for concrete column addition

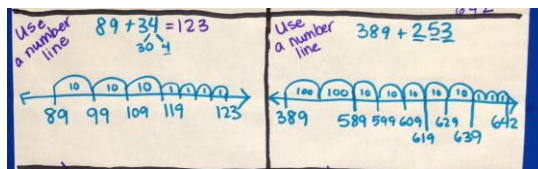| hundreds	tens	ones
➕		
➖		

- Use a **200 grid** to support counting on in tens and bridging 100 and with addition of a three-digit and a two -digit number:

165 + 56 = 221   165 + 50 + 6

1 to 200 Number Square

Use a number line   89 + 34 = 123
30 4
89   99 109 119   123

Use a number line   389 + 253
389   589 599 609 629   642
619 639

257 + 384 =

Use the language of place value to ensure understanding: 'Eight add four equals 12. Write two in the ones column and 'carry' one (10) across into the tens column. 60 add 20 and the ten we 'carried' equals 90. Write 9 (90) in the tens column. 92 is the answer.'

The digit that has been 'carried' should be recorded under the line in the correct column.

When pupils are confident, extend with examples where it is necessary to bridge across the tens and the hundreds:
76 + 47 = 123

```
        76
      + 47
        13 (ones)
       110 (tens)
       123
```

Add the least significant digits (ones) together first and then the tens in preparation for the formal written method. Writing the ones and tens is not necessary as long as the pupils understand the method.

If pupils are ready introduce the formal written method, where it is necessary to 'carry' across the columns and bridge 100.

76 + 47 + 123

Use the language of place value to ensure understanding: 'Seven add six equals 13. Write 3 in the ones column and 'carry' one (10) across to the tens column. 40 + 70 and the ten that we 'carried' equals 120. Write 2 (20) in the tens column and 'carry' one (100) across into the hundreds column (100).   1 1

The digits that have been 'carried' should be recorded under the line in the correct column.
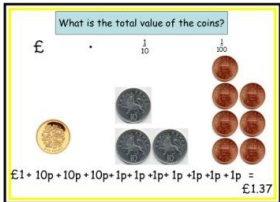
		If pupils are confident, further develop with the addition of a three- digit number and a two digit number. If, at any time, pupils are making significant errors, return to previous stage in calculation.

Vocabulary

Add, more, and, plus, make, total, altogether, score, double, one more, tens, ones, place value, worth, column, tens digit, ones digit, digit, 2 digit number (When ready - Three digit number, hundreds digit, hundreds)

Links to Other Strands	Numicon Links
Use coins as ones, tens and hundreds, 1p, 10p, £1 Estimating and using the inverse to check Solve addition problems in context deciding which operations to use and why Recognising place value up to 3 digit numbers Estimate, calculate, compare different measures, including money in £ and p (including fractions and decimals) Addition of fractions with the same demoninator to become fluent Counting using simple fractions and decimals forwards	Children may need support for place value, and understanding worth of numbers so use for this Most children should be using place value counters or base ten to support their visual understanding as a concrete activity but also whilst using asbstract or pictorial methods too.

Calculation Guidance – Addition Stage 5
'When you add a number, it gets bigger'

- Add numbers with up to 4 digits using the formal written method of columnar addition where appropriate
- Continue to teach the use of **empty number lines** with three and four digit numbers, as appropriate.
- Further develop the formal written method of addition, with three-digit numbers. Revisit the **expanded method** first, if necessary.

If pupils are confident, introduce the addition of a four-digit number and a three digit number.

Continue to develop with addition of two four-digit numbers and with decimals (in the context of money or measures).
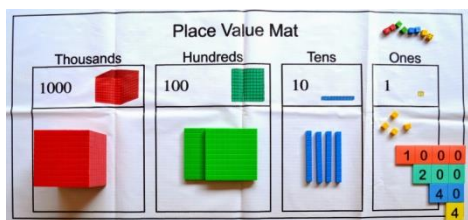
Concrete	Pictoral	Abstract
As in previous stage plus... Decimals/Money Place value 	As in previous stage plus... Drawing of base 10 or place value counters to support understanding of abstract and showing concrete. Use of number line to count on using partitioning method – thousands, hundreds, tens, and ones	$176 + 147 = 323$ $\begin{array}{r} 176 \\ +147 \\ \hline 13 \\ 110 \\ +200 \\ \hline 323 \end{array}$ This will lead into the **formal written method**: Use the language of place value to ensure understanding: 'Seven add six equals 13. Write 3 in the ones column and 'carry' one across into the tens column (10). 40 add 70 and then the ten that we carried equals 120. Write 2 in the tens column (20) and 'carry' 1 (100) across into the hundreds column. 100 add 100 and the 100 that has been carried equals 300. Write 3 in the hundreds column (300). The digits that have been 'carried' should be recorded under the line in the correct column (the next column).
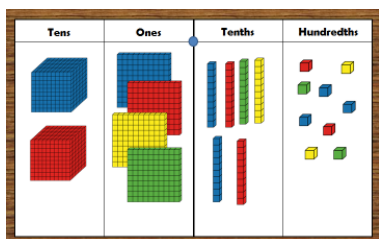
Vocabulary

Add, more, and, plus, make, total, altogether, score, double, one more, tens, ones, place value, worth, column, tens digit, ones digit, digit, 2 digit number

Three digit number, hundreds digit, hundreds, four digit number, thousands, calculation

Links to Other Strands	Numicon/Number Links
Estimate and use inverse operations to check answers Solve 2 step addition problems – use pictoral bar method/jottings to support this Recognise place value in a 4 digit number Measures – money, length, perimeter, Addition of fractions, decimals Do not move onto the next stage until this one has been mastered.	Making 2 digit numbers with plates then moving onto base 10 or place value counters or cards as its easier to manipulate as you use bigger numbers. 999= 900 + 90 + 9 Always start with familiar manipulative for a visual when modelling a new concept, and then move onto either base ten or place value counters to support visually with more abstract concepts Remember numicon can still be used for problem solving, doubling, Ensure children understand the value of these numbers and use the right terminology for ones and tens to help with column methods.

Calculation Guidance – Subtraction Stage 1

"When you subtract, the number gets smaller."

- Pupils will engage in a variety of counting songs and rhymes and practical activities. Involving counting backwards or taking away
- In practical activities and through discussion they will begin to use the vocabulary associated with subtraction.
- They will find one less than a given number.
- They will begin to relate subtraction to 'taking away' using objects to count 'how many are left' after some have been taken away.

Pupils will begin to count back from a given number.

Concrete

Actual apples or other objects to physically take away and remove or hide from a whole

Numicon number line to use and count backwards

one less than 7 is six
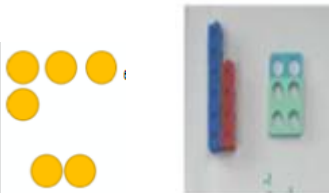
six take away 2 makes 4

Pictoral

I have 6 apples, 2 get eaten, how many are left.
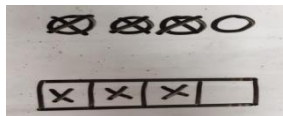
There are 4 books. I have read 3 of them. How many are left to read?

Abstract

0 1   2   3 4   5   6   7   8   9   10

Labelling numicon plates on a numberline and counting back wards from 10

Do not move onto the next stage until this one has been mastered.
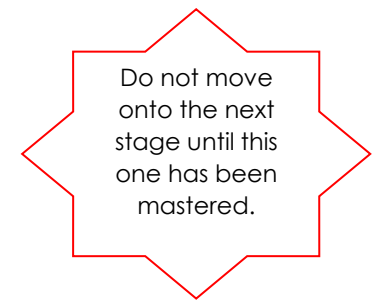
 4 take away 1 is 3

Vocabulary
Take away, how many are left?, less, one less, makes, is, equals

Links to Other Strands	Numicon/Number Links
Take away from and decease numbers, counting backwards.	Pupils should be able to recognise the Numicon plates to 10.
Discuss and solve subtraction problems in familiar practical contexts.	Name or label the plates using digits
Compare, describe and solve practical (measure) problems e.g. shorter than, lighter than, less than	Put in order in step sequence starting with 10 at the end.
	Find a missing numicon shape in the step sequence
	Label the step sequence with digit cards 1 – 10
	Use Numicon when solving subtraction calculations – placing the whole underneath the number to take away and (hiding it) to see what shape fits on the part that is left? Or placing the number of numicon pegs in the takeaway number to see what is left.

Calculation Guidance – Subtraction Stage 2
"When you subtract, the number gets smaller."

- Given a number, identify one less
- Read, write and interpret mathematical statements involving subtraction (-) and the equals (=) sign
- Subtract one-digit and two-digit numbers within 20, including zero
- Solve missing number problems (20 - ? = 15)
- Count on to find the difference

Pupils will continue to practise counting back from a given number to 20

Do not move onto the next stage until this one has been mastered.

Concrete

Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.

13-4=
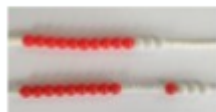
Use counters and move them away from the group as you take them away counting backwards as you go.

9-5

Difference between
13 and 8
13 – 8 = _
8 + _ = 13

Pictoral

Initally use number track or numicon line to count back from 10 gradually increasing to 20

1 2 3 4 5 6 7 8 9 10

9 – 5 = 4 'Put your finger on number nine. Count back 5.'

0 1 2 3 4 5 6 7 8 9 10

Then from numbers to 20
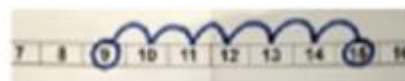
Abstract

$18 - 3 = 15$

$8 - 2 = 6$

Put 13 in your head, count back 4. What number are you at? Use your fingers to help.

Move to using numbers within the part whole model.

5
10

$16 - 8 =$

How many do we take off to reach the next 10?

How many do we have left to take off?

27

14 − 5 =

Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.

Compare amounts and objects to find the difference. Use cubes to build towers, numicon or make bars to find the difference.
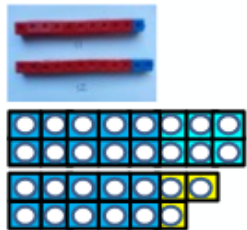
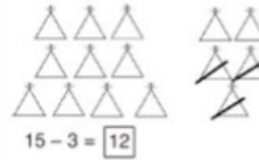Use basic bar models with items to find the difference.
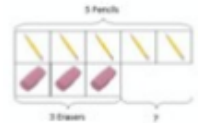
Link to addition- use the part whole model to help explain the inverse between addition and subtraction.
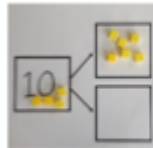
If 10 is the whole and 6 is one of the parts. What is the other part?
10 - 6 =

Cross out drawn objects to show what has been taken away.

$15 - 3 =$ [12]

3	?
7	

7 - 3 = ?   Bar Model

Use a pictorial representation of objects to show the part part whole model.
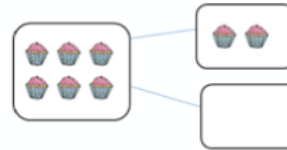
4 planes.   1 flies away.   3 are left.
4 take away 1 is 3.

$4 - 1 =$ ☐

5 planes.   2 fly away.   3 are left.
5 take away 2 is 3.

$5 - 2 =$ ☐
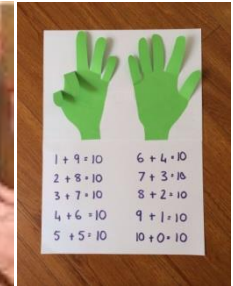
Subtraction using counters
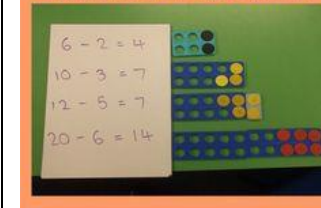
Whack-a-Ball
Subtraction Game

6 less than 10 is 4

	6 less than 10 is 4	

<u>Vocabulary</u>
Find the difference, take away, how many are left?, less, one less, makes, equals, is, smaller

<u>Links to Other Strands</u>	<u>Numicon/Number Links</u>
- Combine and decrease numbers, counting backwards. - Develop the concept of subtraction and use the operations flexibly. - Discuss and solve problems in familiar practical contexts. - Compare, describe and solve practical (measure) problems e.g. shorter than, lighter than.	Pupils should be able to recognise the Numicon plates to 20. Name or label the plates using digits (numerals) Put in order in step sequence starting with 10 at the end – going backwards right to left Find a missing numicon shape in the step sequence Label the step sequence with digit cards 1 – 20 Use Numicon when solving subtraction calculations – placing the whole underneath the number to take away and (hiding it) to see what shape fits on the part that is left? Or placing the number of numicon pegs in the takeaway number to see what is left.

Calculation Guidance – Subtraction Stage 3
"When you subtract, the number gets smaller"

- Subtract numbers using concrete objects, pictorial representations, and mentally, including:
- Take away a one digit number from a two digit number
- Take away tens numbers from a two digit number
- Take away a two-digit number from a larger 2 digit number

Counting on to find a small difference

Count up from the smallest number to the largest to find the difference.
32 – 28 = 4   28   29   30   31   32
 'The difference between 28 and 32 is 4.'

If pupils are confident, further develop this method:
76 – 58 = 18   58   60   70   76
'The difference between 58 and 76 is 18.'

Further develop subtraction with numbers that bridge 100, using a 200 grid to support.

Initially begin with using numbers to 50, then 75 and then 100 as they build confidence in numbers and their value.

Do not move onto the next stage until this one has been mastered.
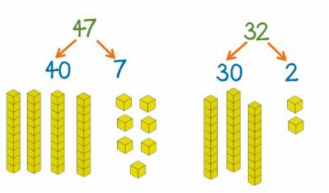
| Concrete	Pictoral	Abstract
Subtract: 47 – 32. 47 → 40 7 32 → 30 2	Number track / Number line – jumps of 1 then efficient jumps using number bonds 23 – 5 = 18 ●●●●●●●●●●○○○○○○○○○—○○●●● Counting back using an empty number line within 100, in ones: 34 – 6 = 28 28, 29, 30, 31, 32, 33, 34 And in tens:	Subtraction, using partitioning, on an empty number line: 76 – 45 = 31 (76 – 4 tens and 5 ones) Counting back in tens and ones: 76, 66, 56, 46, 36, 35, 34, 33, 32, 31 If pupils are confident, use more efficient jumps: (76 – 4tens (40) and 5 ones (5)) 76 36 31

Column method using base 10.

48-7

73 − 40 = 33

82 − 50 =
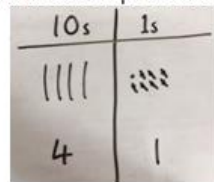
---
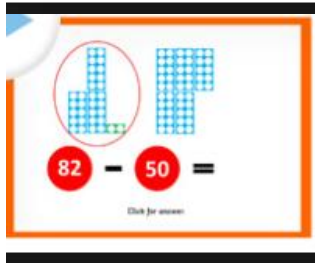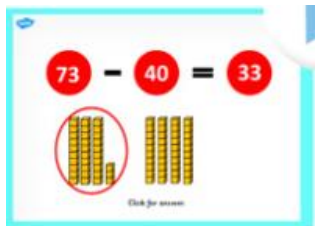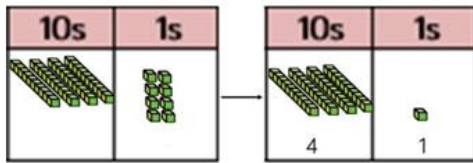
58 – 30 = 28   28, 38, 48, 58

| Subtraction number line always start from biggest number on right and go backwards. |

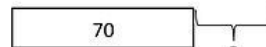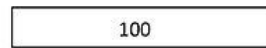Use in conjunction with a 100 square to show jumps of tens and then tens and ones when appropriate.

54—32 = 22

Children to represent the base 10 pictorially.

48-7 =

| 100 |

| 70 |
?

100 – 70 =?

Use in conjunction with a 100 square to show jumps of tens and ones/units.
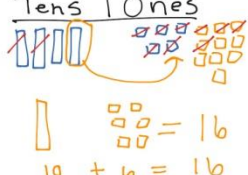
Count up from the smallest number to the largest to find the difference.
32 – 28 = 4   28   29   30   31   32
 'The difference between 28 and 32 is 4.'

If pupils are confident, further develop this method:
76 – 58 = 18   58   60   70   76
'The difference between 58 and 76 is 18.'

Further develop subtraction with numbers that bridge 100, using a 200 grid to support.

45
-29
16

Tens | Ones

□ □□ = 16
10 + 6 = 16   Regrouping to carry

Vocabulary
Find the difference, take away, how many are left?, less, one less, makes, equals, is, smaller, subtract, subtraction, what is the difference between, How many less is ? than ?,

Links to Other Strands
Counting down in tens, fives, twos, threes,
Calculating change when using money
Solve problems using various concrete and pictoral representations
Apply increasing knowledge of written methods
Partition numbers in different ways
Discuss and solve problems that emphasis the value of each digit in 2 digit numbers
Counting down in fractions from 10

Number/Numicon Links
making 2 digit numbers with plates then moving onto base 10 as its easier to

manipulate as you use bigger numbers.

Always start with numicon when modelling a new concept, and then move onto either base ten or place value counters to support visually with more abstract concepts

Remember numicon can still be used for problem solving, doubling,
Ensure children understand the value of these numbers and use the right terminology for ones and tens.

Calculation Guidance – Subtraction Stage 4
"When you subtract, the number gets smaller"

- Subtract numbers with up to three digits, using formal written method of columnar subtraction

Further develop the use of the empty number line with calculations that bridge 100:

126 – 45 = 81   81   86   96   106   116   126

Use practical equipment to support counting back in tens and bridging 100 such as 200 grid, Numicon, Cuisinaire rods etc.
Then use more efficient jumps: 81   86   96   106   116   126

Extend with larger numbers by counting back:
216 – 27 = 189   189   190   196   216

And by counting on to find the difference (small difference):
231 – 198 = 33   198   200   230   231
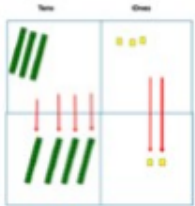'The difference between 198 and 231 is 33.'

- Expanded written method using numbers to total less than 100 **without** decomposition/exchange
- Formal written method using numbers to total less than 100 **without** decomposition/exchange
  Then
- Expanded written method using numbers to total less than 100 **with** decomposition/exchange
- Formal written method using numbers to total less than 100 **with** decomposition/exchange

If pupils are confident, extend the use of the **formal written method** with numbers over 100 (3 digit), returning to the expanded method first, if necessary.

Do not move onto the next stage until this one has been mastered.
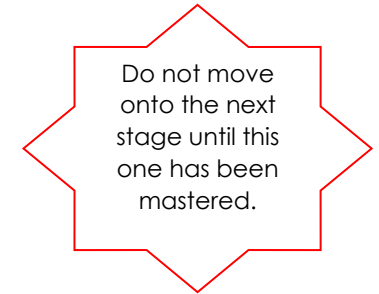
| Concrete	Pictoral	Abstract

Use Base 10 to make the bigger number then take the smaller number away.		Introduce the **expanded written method** with the calculation presented both horizontally and vertically (in columns) and **supported with practical activities**. Use two-digit numbers when introducing this method, initially:
		78 – 23 = 55 70 and 8
		                           −20 and 3
		                           50 and 5 = 55
		'Partition numbers into tens and ones. Subtract the ones, and then subtract the tens. Recombine

Show how you partition numbers to subtract. Again make the larger number first.

Draw the Base 10 or place value counters alongside the written calculation to help to show working.
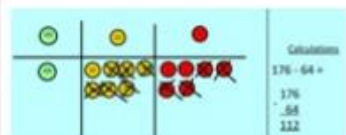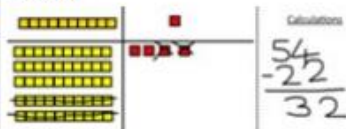
391	
186	?

Raj spent £391, Timmy spent £186. How much more did Raj spend?

Calculate the difference between 391 and 186.

? = 341 – 120 – change position of =

give answer.' Use practical activities to support the teaching of this method.

This will lead into the **formal written method:**

 7 8
-2 3
55

Use the language of place value to ensure understanding. 'Eight subtract three, seventy subtract twenty.'
You could then change word 'and' for '+'.

This will lead to a clear written column subtraction.

Introduce the **expanded written method** where exchange/decomposition is required
73 − 27 = 46
 70 + 3   becomes   60 and 13
- 20 + 7   20 and 7
                        40 + 6 = 46
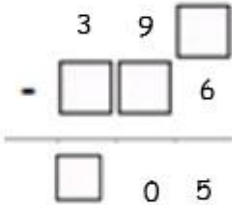
73 is partitioned into 60 and 13 in order to calculate
73 – 27.

This can be demonstrated practically and does not have to be recorded.

When pupils are confident with the expanded method introduce the **formal written method, involving decomposition/exchange:**
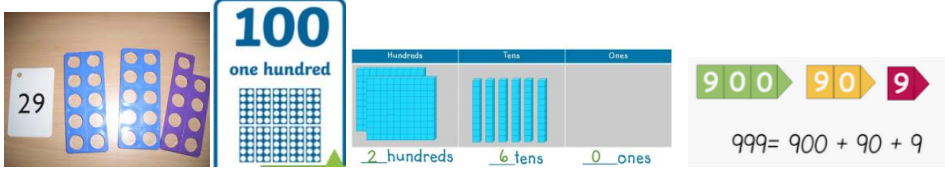
73 − 27 = 46

| | | 6 13
7 3
2 7
4 6 |

$$\begin{array}{c} 3 \quad 9 \quad \square \\ - \quad \square\,\square \quad 6 \\ \hline \square \quad 0 \quad 5 \end{array}$$

Vocabulary
Find the difference, take away, how many are left?, less, one less, makes (equals for KS2) smaller, subtract, subtraction, what is the difference between, How many less is ? than ?, columns, carry/move across, exchange,

Links to Other Strands
Counting down in multiples
Calculating change when using money less than £1
Solve problems using various concrete and pictoral representations
Apply increasing knowledge of written methods
Partition numbers in different ways
Discuss and solve problems that emphasis the value of each digit in 2 digit numbers
Counting down in fractions from 10

Number/Numicon Links
Making 2 digit numbers with plates then moving onto base 10 or place value counters or cards as its easier to manipulate as you use bigger numbers.

Always start with familiar manipulative for a visual when modelling a new concept, and then move onto either base ten or place value counters to support visually with more abstract concepts

Remember numicon can still be used for problem solving, doubling, Ensure children understand the value of these numbers and use the right terminology for ones and tens to help with column methods.

Calculation Guidance – Subtraction Stage 5
"When you subtract, the number gets smaller"

- Subtract numbers with up to 4 digits using the formal written method of columnar subtraction where appropriate

Continue to teach the use of empty number lines with three and four digit numbers, as appropriate.
Continue to develop the formal written method of subtraction by revisiting the expanded method first, if necessary.
Continue to use base –ten / Numicon materials to support understanding.

Concrete	Pictoral	Abstract
	Drawing a base ten or place value counters into column grid to support.	See stage 4 for support in getting to this point.

Pictoral:

Drawing a base ten or place value counters into column grid to support.

Drawing a blank numberline to count back on – or count up to find the difference

Abstract:

See stage 4 for support in getting to this point.

Do not move onto the next stage until this one has been mastered.

Vocabulary

Find the difference, take away, how many are left?, less, one less, makes (equals for KS2) smaller, subtract, subtraction, what is the difference between, How many less is ? than ?,

Links to Other Strands

Counting down in multiples

Calculating change when using money using pounds and pence

Solve problems using various concrete and pictoral representations

Apply increasing knowledge of written methods

Partition numbers in different ways

Discuss and solve problems that emphasis the value of each digit in 3 or 4 digit numbers

Measures - problem solving everyday situations

Counting down in fractions from 10

Numicon/Number Links

Making 3 and 4 digit numbers with base 10 or place value counters

999 = 900 + 90 + 9   Or place value cards

Always start with a familiar manipulative (Base ten) when modelling a new concept, and then move onto either base ten or place value counters to support visually with more abstract concepts

Remember numicon can still be used for problem solving, doubling,

Ensure children understand the value of these numbers and use the right terminology for ones, tens, hundreds, thousands to help with column methods.

Calculation Guidance – Multiplication Stage 1
"When you multiply, the number gets bigger"

- Pupils will engage in a wide variety of songs and rhymes, games and activities. In practical activities and through discussion they will begin to solve problems involving doubling.

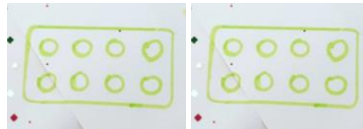| Concrete	Pictoral	Abstract

'Three apples for you and three apples for me. How many apples altogether?'
 	
 Real life doubles
 	
  5 fingers and 5 fingers. There is the same on each hand. How many fingers altogether?
 	
  A six and a six – they are the same – How many dots altogether?
	Draw doubles
	
	  Draw two things that are the same.
		Do not move onto the next stage until this one has been mastered.

Vocabulary
The same, double, how many altogether?

Links to Other Strands
Addition – numbers getting bigger
Shape and space – 2D and 3D shape matching
Counting up
Patterns
Problem Solving using familiar contexts

Numicon/Number Links
Finding numicon plates that are the same and using their number names
Pupils should be able to recognise the Numicon plates to 10.
Name or label the plates using digits
Put in order from 1 to 10 making the step sequence
Find a missing numicon shape in the step sequence
Label the step sequence with digit cards 1 – 10
Fitting plates together – step+step, step+non step, non step+non step together

Calculation Guidance – Multiplication Stage 2
"When you multiply, the number gets bigger"

- Link to repeated addition (2+2+2) (5+5) (10+10+10+10)
- Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher
- Count in multiples of twos, fives and tens (to the 10th multiple)
- Continue to look at doubles

Pupils will count repeated groups of the same size in practical contexts. They will use the vocabulary associated with multiplication in practical contexts. They will solve practical problems that involve combining groups of 2, 5 or 10. E.g. socks, fingers and cubes

Use arrays to support early multiplication   2 x 5 = 10 (2 lots of/groups of 5)

'Two groups of five faces'. How many faces altogether? 2, 4, 6, 8, 10'. Two groups of five faces. How many faces altogether? 5, 10'

'2 groups of 5'
'How many altogether?'
'5+5=10'
Double five is ten

Only use 2's 5's and 10's numbers at this level. Therefore only groups of these – you can have 4 groups of 5 but not 5 groups of 4!!

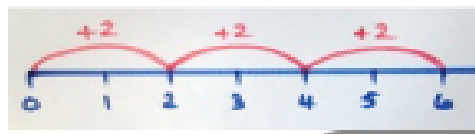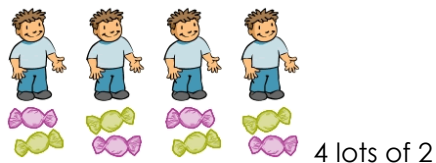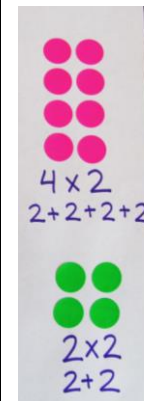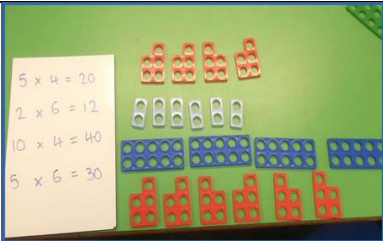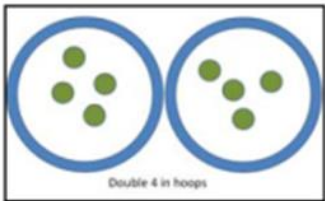| Concrete	Pictoral	Abstract
'Five pairs of socks. How many socks altogether? 2, 4, 6, 8, 10' (Actual socks)		
'Three pots of ten crayons. How many crayons altogether? 10, 20, 30'	4 lots of 2 Write addition sentences to describe objects and pictures. 4×2 $2+2+2+2$ 2×2 $2+2$	

5 x 4 = 20
2 x 6 = 12
10 x 4 = 40
5 x 6 = 30
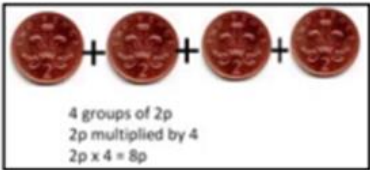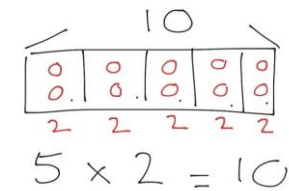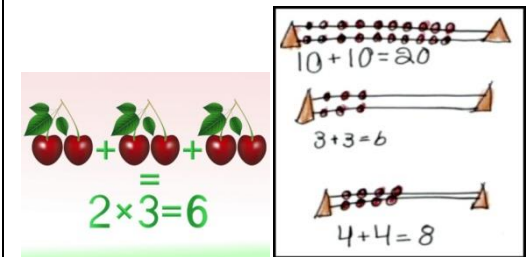
4 lots of 5, 6 groups of 2, 4 times 10, 6 x 5
Children don't necessarily have to find the answer they could just match the visual with the calculation – then find the answer being the next step.

4 groups of 2p
2p multiplied by 4
2p x 4 = 8p

Double 4 in hoops

By Year 1
Using manipulatives
(numicon)
Links to array

4 lots of 2

2 groups of 5 (5 x 2) using Numicon

Real life contexts and use of practical equipment to count in repeated groups of the same size:

How many wheels are there altogether?

How much money do I have?

X X   X X   X X

How many groups of 2 are there?

2+2+2+2+2=10

5
4
5+5+5+5=20

what I have learned

Then link to 4 x 5 =
Writing or reading calculations for either pictoral or concrete examples.

+ = 2×3=6

10 + 10 = 20
3 + 3 = 6
4 + 4 = 8

10
2 2 2 2 2
5 x 2 = 10

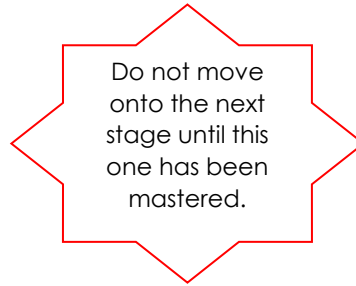Vocabulary
Lots of, groups of, times, x, =, multiplied by, arrays, the same, double, how many altogether,

Links to Other Strands	Numicon Links
Doubling and doubles	Numbers to 20 and beyond
Counting up on number lines	Using plates to support finding totals and counting up
Division – inverse	Make numberline to 20 and label with numerals
Patterns in the number sequence	Make, recognise, use teen numbers from the two plates (2 digit)
Discuss and solve familiar practical problems	tens and ones
	Use numicon to add numbers to total no more than 20
	Use numcion to find number bonds/pairs to 10 and then link to number bonds/pairs to 20
	Matching plates to 2p, 5p, 10ps

Do not move onto the next stage until this one has been mastered.

Calculation Guidance – Multiplication Stage 3
"When you multiply the number gets bigger"

- Recall and use multiplication facts for the 2, 5 and 10 multiplication tables
- Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs
- solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts
- show that multiplication of two numbers can be done in any order (commutative)

Pupils will use a range of vocabulary to describe multiplication and use practical resources, pictures, diagrams and the x sign to record.

Combining Groups (repeated addition):

'3 groups of 10 crayons'
'How many crayons altogether?'
'10 + 10 + 10 = 30'
'3 groups of 10'
'3 times 10'
'3 x 10 = 30' '10 x 3 = 30'

Do not move onto the next stage until this one has been mastered.

This stage is similar to stage 2. It deepens the understanding about multiplication and the commutative law associated with it. – Stick to just using 2x, 5x and 10x facts for now.

Use arrays to support multiplication

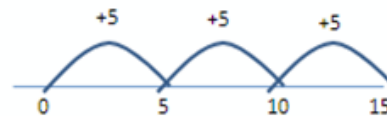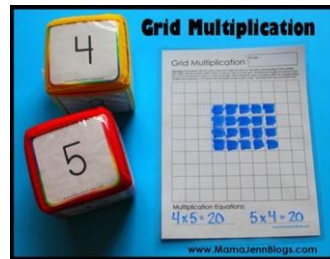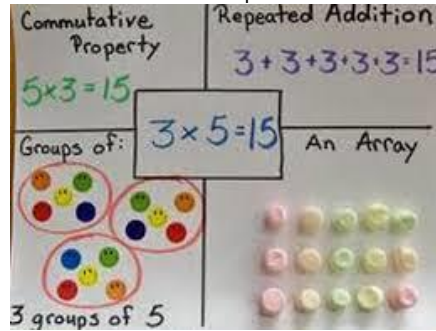| Concrete	Pictoral	Abstract
(See array and other concrete options in Stage 2) Real life arrays EVERYDAY **ARRAYS**	See ideas from Stage 2 aswell. Use an empty number line. 	6 x 5 = 30 '5 + 5 + 5 + 5 + 5 + 5 = 30' '6 rows of 5' '6 groups of 5' '5 groups of 6' '5 lots of 6' '5 times 6' '5 x 6 = 30' '6 x 5 =

Make arrays in here

Make the link to repeated addition.

Commutative Property:
The order of multiplication between two numbers does not matter.

2 × 4 = 8   4 × 2 = 8

2 × 4 = 4 × 2

Doing the 3 times table the first number we need is?

0   3   30

Vocabulary
Lots of, groups of, times, x, =, multiplied by, arrays, multiplication, 'other way round' equals, is, totals, how many altogether? Grid, row, line,

Links to Other Strands
Counting in twos, fives, tens along number stick from 0x to 12x
Number patterns in the number system
Discuss and solve problems in familiar practical contexts, including using quantities and measures.
Odd and even numbers linked to two times table and doubling always = an even number
Division – commutative law/inverse
Measurement – 5 minute intervals telling the time
Tally charts/block diagrams/pictogram when the image/block is the value of 2,5,10
Use coins as manipulatives – 5p, 10p, 2p, £2

Numicon/Number Links
Understanding of 2 digit numbers, use correct terminology for tens and ones.
Building larger numbers as totals to x calculation and understand the value of them.
Use addition techniques with the plate to support this

If children lack number knowledge, just use calculations which are limited to a total they understand – then increase this as number knowledge increases.

Calculation Guidance – Multiplication Stage 4
"When you multiply, the number gets bigger"

- Recall and use multiplication facts for the **3, 4 and 8** multiplication tables (continue to practise the 2, 5 and 10 multiplication tables)
- Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to a formal written method

Continue to use number lines and arrays to support multiplication, as appropriate (see stage 2 and 3 guidance).
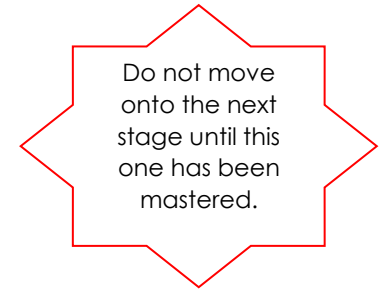
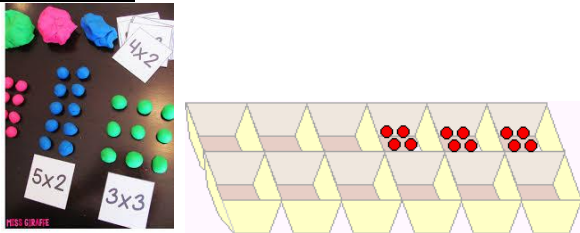4 x 3 = 12   0   3   6   9   12

Teach
-Partitioning method for multiplication of a teen number by a one-digit number:
-Grid Method (teen number multiplied by a one- digit number):
- This will lead into **expanded short multiplication:**
- **Refine the recording in preparation for formal short multiplication:**
- **Formal short multiplication**

Do not move onto the next stage until this one has been mastered.

Continue to develop the formal written method of multiplication throughout year three using teen- numbers multiplied by a one-digit number.
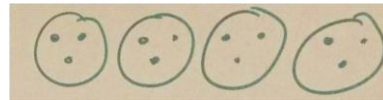
If pupils are confident progress to multiplying other two-digit numbers by a one-digit number (see stage 5 guidance).

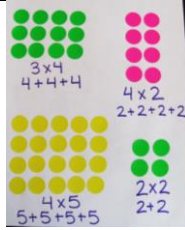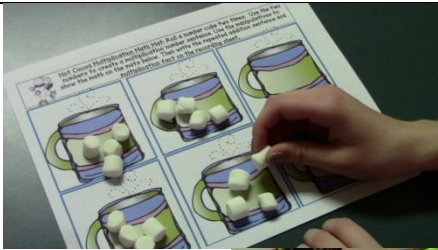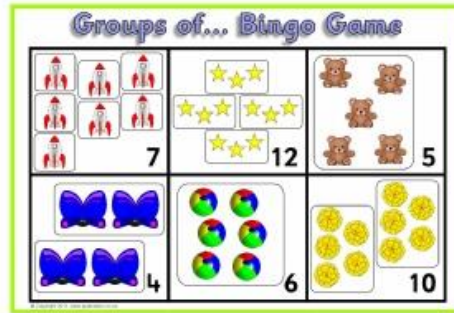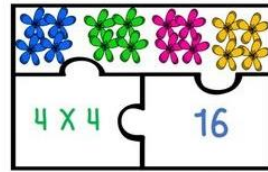| Concrete	Pictoral	Abstract
		Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30 **Partitioning method for multiplication of a teen number by a one-digit number:** 13 x 5 = 65 (Partition 13 into 10 + 3) 10 x 5 = 50

$3 \times 5 = 15$
$50 + 15 = 65$

Demonstrate the partitioning method using a number line.

Grid Method (teen number multiplied by a one-digit number):
$13 \times 8 = 104$

X	10	3
8	80	24

'Partition 13 into 10 + 3 then multiply each number by 8. Add the partial products (80 and 24) together.'

This will lead into **expanded short multiplication:**

```
 13 x 8 = 104            10  3
 X    8
   2  4 (3 x 8)
 + 8  0 (10 x 8)
  10 4
```

Include an addition symbol when adding partial + 8 0 (10 x 8)   products.

Refine the recording in preparation for **formal short multiplication:**
```
10  3
  2  4 (3 x 8)
+8  0 (10 x 8)
 104
```

Count in multiples supported by concrete objects in equal groups.		Use the language of place value to ensure understanding. Include an addition symbol when adding partial +8 0 (10 x 8) products. Model the same calculation using a number line, if necessary, to ensure understanding.
Create arrays using counters/ cubes to show multiplication sentences.	Use the bar model to calculate how many wheels there are altogether.	
4 x 3 = 12 "4 cakes, 3 times" 4 multiplied by 3	___ x ___ = ___	**Formal short multiplication:** 1 3 X 8 10 4
	There are 8 sweets in a packet, how many sweets are there in 4 packets? Which of these is the correct bar model to represent this word problem? Explain your reasoning.	Ensure that the digit 'carried over' is written under the line in the correct column. Use the language of place value to ensure understanding.
	8 8 8 8 / 4 4 4 4 4 4 4 4	
	Draw the bar model and write the number sentence to work out the answer to this problem. Freddy gets £12 pocket money every month. He saves his pocket money for 5 months. How much money has he saved?	
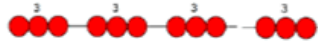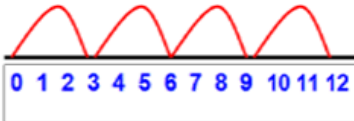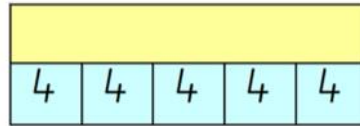
Vocabulary
Lots of, groups of, times, x, =, multiplied by, arrays, multiplication, 'other way round' equals, is, totals, how many altogether? Grid, row, line,

Links to Other Strands	Numicon/Number Links
Counting in threes, fours, eights along number stick from 0x to 12x Number patterns in the number system Discuss and solve problems in familiar practical contexts, including using quantities and measures. Odd and even numbers linked to two times table and doubling always = an even number Division – commutative law/inverse Measurement – 5 minute intervals telling the time Tally charts/block diagrams/pictogram when the image/block is the value of 2,5,10 Use coins as manipulatives – 5p, 10p, 2p, £2	Understanding of 2 digit numbers, use correct terminology for tens and ones. Step counting Building larger numbers as totals to x calculation and understand the value of them. Use addition techniques with the plates to support this If children lack number knowledge, just use calculations which are limited to a total they understand – then increase this an number knowledge increases.

Calculation Guidance – Multiplication Stage 5
"When you multiply, the number gets bigger"

- Recall multiplication facts for multiplication tables up to 12 × 12
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout

Use the language of place value to ensure understanding. Ensure that the digits 'carried over' are written under the line in the correct column.

Concrete	Pictoral	Abstract
		Continue to use empty number lines, as appropriate (see stage 4 guidance).

Abstract

Continue to use empty number lines, as appropriate (see stage 4 guidance).

Further develop the grid method for two-digit numbers multiplied by a one- digit number.
36 x 4 = 144

X	30	6
4	120	24

120 + 24 = 144 (add the partial products)

Expanded short multiplication (two-digit number by a one-digit number):

```
36 x 4 = 144              30  6
                         x     4
                          2 4 (4 x 6 = 24)
                        + 1 2 0 (4 x 30 = 120)
                          1 4 4
```
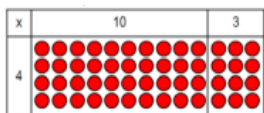
Include an addition symbol when adding partial products.

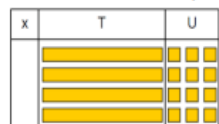Refine the recording in preparation for the formal short multiplication.

```
36 x 4 = 144             3 6
                         x 4
                          2 4 (4 x 6)
                        +120 (4 x 30)
                         144
```

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

4 rows of 10
4 rows of 3

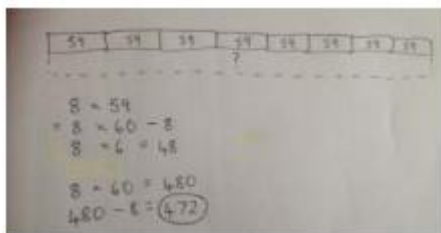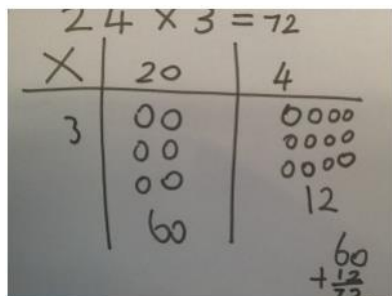Move on to using Base 10 to move towards a more compact method.

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

Calculations 4 x 126
Calculations 4 x 126

each row with 126.

Do not move onto the next stage until this one has been mastered.

This leads to **short multiplication (formal method)** of a two–digit number multiplied by a one- digit number. If necessary return to the grid method first:

127 x 6 = 762

X	100	20	7
6	600	120	42

600 + 120 + 42 = 762

This leads to **expanded short multiplication:**

1 2 7 X 6 = 762

```
    2   2   7
  X         6
        4   2     (6 x 7)
+1  2   0         (6 x 20)
+ 6 0   0         (6 x 100)
    7   6   2
```

This will lead into **short multiplication (formal method):**

```
 1 2 7
 X   6
 7 6 2
```

Vocabulary
Lots of, groups of, times, x, =, multiplied by, arrays, multiplication, 'other way round' equals, is, totals, how many altogether? Grid, row, line,

Links to Other Strands
Problem solving in familiar contexts
Multiples of 2,3,4,5,6,7,8,9,10,11,12
Scales in Pictogram/bar charts etc.

Numicon Links
Making 2 digit numbers with plates then moving onto base 10 or place value counters or cards as its easier to manipulate as you use
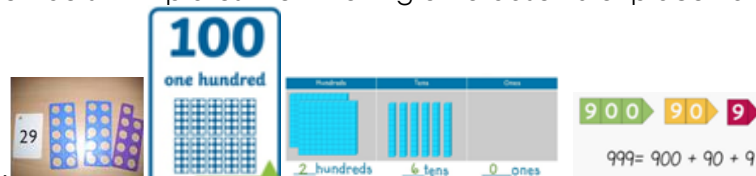
bigger numbers.
Always start with familiar manipulative for a visual when modelling a new concept, and then move onto either base ten or place value counters to support visually with more abstract concepts

Equivalent fractions	Remember numicon can still be used for problem solving, doubling, Ensure children understand the value of these numbers and use the right terminology for ones and tens to help with column methods.

Calculation Guidance – Multiplication Stage 6
"When you multiply, the number always gets bigger"

- Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

Build on the work covered in stage 5 with the formal method of short multiplication (two-digit number multiplied by a one-digit number).

When pupils are confident introduce multiplication by a two-digit number. If necessary, return to the grid method and/or expanded method first.

Concrete	Pictoral	Abstract
Show the link with arrays to first introduce the expanded method.	 	**Expanded long multiplication** (two-digit numbers multiplied by a teen-number) $23 \times 13 = 299$ $\begin{array}{r} 2\ 3 \\ \times 1\ 3 \\ \hline 9 \ (3 \times 3) \\ 6\ 0 \ (3 \times 20) \\ +\ 3\ 0 \ (10 \times 3) \\ 2\ 0\ 0 \ (10 \times 20) \\ \hline 2\ 9\ 9 \end{array}$ **Compact long multiplication (formal method):** $23 \times 13 = 299$ $\begin{array}{r} 2\ 3 \\ \times 1\ 3 \\ +\ 6\ 9 \ (3 \times 23) \\ 2\ 3\ 0 \ (10 \times 23) \\ \hline 2\ 9\ 9 \end{array}$ *(Do not move onto the next stage until this one has been mastered.)* Use the language of place value to ensure understanding. Add the partial products Extend to larger two-digit numbers (returning to the grid method and then expanded method if necessary)

Pictoral table:

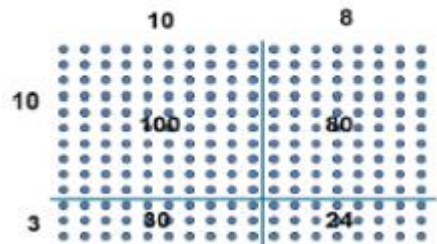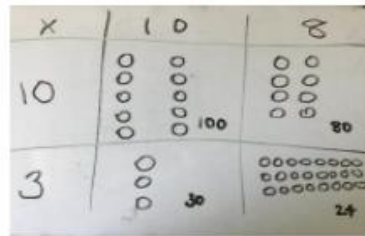| X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

Vocabulary
Lots of, groups of, times, x, =, multiplied by, arrays, multiplication, 'other way round' equals, is, totals, how many altogether? Grid, row, line,

Links to Other Strands
Problem solving in familiar contexts
Multiples of 2,3,4,5,6,7,8,9,10,11,12
Scales in Pictogram/bar charts etc.
Equivalent fractions

Numicon/Number Links
Making 2,3,4 digit numbers with base 10 or place value counters or cards as its easier to manipulate as you use bigger numbers.

$999 = 900 + 90 + 9$

	Always start with familiar manipulative for a visual when modelling a new concept, and then move onto either base ten or place value counters to support visually with more abstract concepts

Calculation Guidance – Division Stage 1
'When you divide, the number gets smaller'

- Pupils will engage in a wide variety of songs and rhymes, games and activities.
- In practical activities and through discussion they will begin to solve problems involving halving and sharing.

Share the apples between two people.

'Half of the apples for you and half of the apples for me.'

Do not move onto the next stage until this one has been mastered.
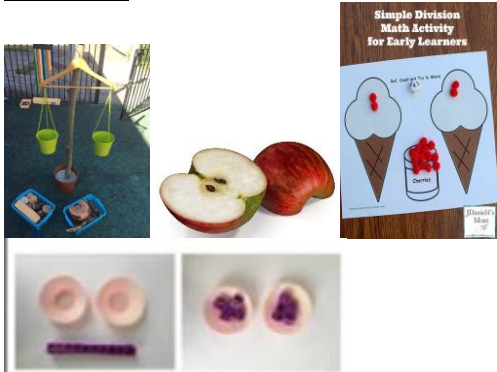
Concrete	Pictoral	Abstract
	Draw the concrete manipulatives used in activity Share this food between you and me – draw both our lunches.	

Vocabulary
Share, half, group, part, same on both sides, same number of both sides, fair

Links to Other Strands	Numicon/Number Links
Simple fractions – part of a whole number/shape Odd and even numbers - patterns Even and equality Counting number in each group Counting up Patterns Problem Solving using familiar contexts	Find plates that are the same, equal Look at/sort plates which are even – without a step and not even – with a step Recognising numicon plates to 10 Name and label plates with digit cards Ordering and counting back from 10 – 0 Labelling step sequence 10 - 0

Calculation Guidance – Division Stage 2
"When you divide, the number gets smaller"

- Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher
- Count in multiples of twos, fives and tens (to the 10th multiple)

Pupils will start with practical sharing using a variety of resources. They will share objects into equal groups in a variety of situations. They will begin to use the vocabulary associated with division in practical contexts.

'Share these eight apples equally between two pupils. How many apples will each child have?'
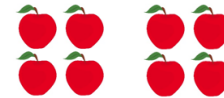
'Share 20 crayons between 2 pots.' 'How many crayons are in each pot?'

Pupils will move from sharing to grouping in a practical way.

'Put 20 crayons into groups of 10. How many pots do we need?'

Use arrays to support early division.
'How many faces altogether? How many groups of two?'

'Five groups of two.'
'How many groups of 5?'
'10 shared equally between 2 people.'
'Half of ten is five.'
Continue to solve problems in practical contexts throughout stage 2, and develop the language of early division, with appropriate resources.

Do not move onto the next stage until this one has been mastered.

To begin with share numbers no bigger than 20 into their factors. – for example

15 shared into 5

12 shared into 2

9 shared into 3
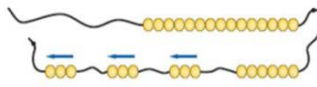
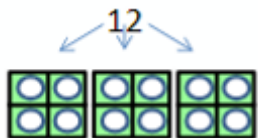| Concrete	Pictoral	Abstract

Concrete

Sharing
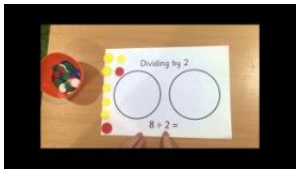
Grouping

How many groups of 2 are there in 14?

Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.

Pictoral

Division

$14 \div 2 = 7$

14 "shared between" 2

$14 \div 2 = 7$

14 "into groups of" 2

$8 \div 2 = 4$
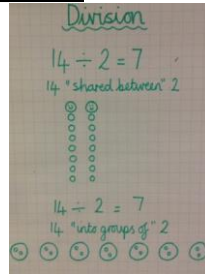
½ of 14
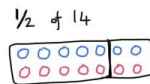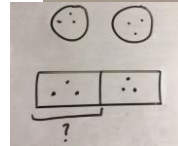
Use a number line to show jumps in groups. The number of jumps equals the number of groups.
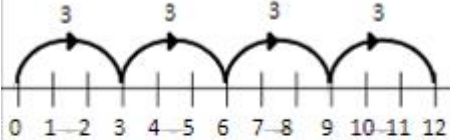
Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.

20

$20 \div 5 = ?$
$5 \times ? = 20$
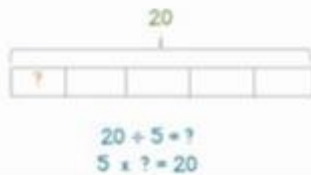
Draw an array and use lines to split the array into groups to make multiplication and division sentences.

Abstract

Division

$14 \div 2 = 7$

14 "shared between" 2

$14 \div 2 = 7$

14 "into groups of" 2
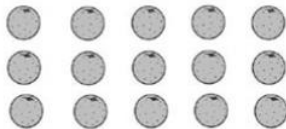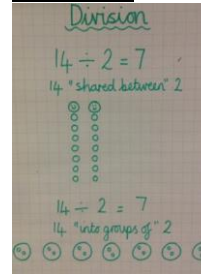
Share 9 buns between three people.

$9 \div 3 = 3$

$15 \div 3 =$

15 grouped into 3's

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.

20

$20 \div 5 = ?$
$5 \times ? = 20$
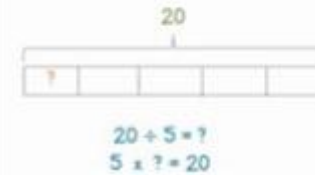
Link division to multiplication by creating an array and thinking about the number sentences that can be created.

Eg $15 \div 3 = 5$ $5 \times 3 = 15$
$15 \div 5 = 3$ $3 \times 5 = 15$

Vocabulary

Share, sharing, share them out, groups, half, divide, groups of, equally, equal, the same, divide, fair, all the groups the same, share equally

Links to Other Strands	Numicon/Number Links
Halves Fractions Odd and even numbers - patterns Multiplication – inverse, number families, times tables, Counting in multiples – 2,5,10's Recognition of patterns in the number system Problem solving in familiar situations	Counting to 20 forwards and backwards Step sequence building 0 - 20 Recognising teen numbers, building, naming, labelling, using 2 plates and using tens and ones vocab. Fitting plates inside shapes of other plates – can 2 number 4 plates, fit inside a 7? Can 3 number 2 plates fit inside a 6?
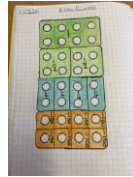
Calculation Guidance Division Stage 3
"When you divide, a number it gets smaller"

- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables up to 12x
- Calculate mathematical statements for division within the multiplication tables they know and write them using the division (÷) and equals (=) signs
- Solve problems involving division, using materials, arrays, repeated subtraction, mental methods, and multiplication and division facts, including problems in contexts

Pupils will use a range of vocabulary to describe division and use practical resources, pictures, diagrams and the ÷sign to record, using multiples that they know.

Sharing and grouping

Using arrays to support division

On Word ÷ sign

NumLock on,
Press down Alt
then 0247

Concrete
Use the ideas from Stage 2 but use for the whole of 2,5,10 x tables up to their 12x

- Representations to support multiplicative reasoning:

Using Dienes: "If 40 ÷ 10 = 4 and 30 ÷ 10 = 3, what do you think 70 ÷ 10 would be? Why?"
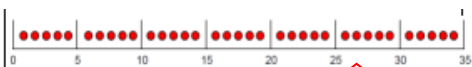
How many 10s in 40?

Do not move onto the next stage until this one has been mastered.

Pictoral
Use the ideas from Stage 2 but use for the whole 2,5,10 x tables up to their 12x

Children to represent repeated subtraction pictorially.
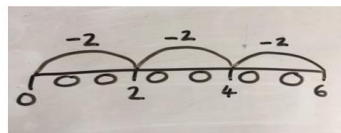
0000000000
0000000000
0000000000
0000000000

40÷4= How many tens in forty, How many groups of 10 make 40? etc

Abstract
Use the ideas from stage 2 but use for whole of 2,5,10 x tables up to their 12x

40÷10 =
Abstract number line to represent the equal groups that have been subtracted.

3 groups
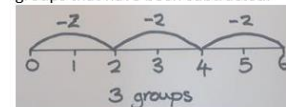
Sharing and Grouping
'50 crayons shared equally between 5 pots.' (Sharing) 'We have 50 crayons and put ten in each pot. How many pots do we need?' (Grouping).

'50 divided by 10 = 5'
'50 divided by 5 = 10'
50 ÷ 10 = 5
50 ÷ 5 = 10

		Using arrays to support division
		$15 \div 5 = 3$
		$15 \div 3 = 5$
		How many groups of 3?
		How many groups of 5?
		15 shared between 3 people is…?
		15 shared between 5 people is…?
		15 divided by 5 = 3
		15 divided by 3 = 5
		When pupils are ready, use an empty number line to count forwards:
		$30 \div 5 = 6$
		'How many jumps of 5 make 30?'
		0 5 10 15 20 25 30

Vocabulary

Share, sharing, share them out, groups, half, divide, groups of, equally, equal, the same, divide, ÷

Links to Other Strands	Numicon/Number Links
Halves	Using plates to count up in 2's 5's, 10's
Fractions – writing building, and recognising	Skip counting
Odd and even numbers	Understanding, naming, building 2digit numbers
Multiplication – inverse, number families, times tables,	Use subtraction techniques with numicon/ base 10 to support repeated
Counting in multiples 2,5,10 from 12x to 0	subtraction and grouping
Writing and telling the time to 5mins	Use correct terminology for tens and ones.
	If children lack number knowledge, just use calculation

Calculation Guidance – Division Stage 4
"When you divide, a number it gets smaller"

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (continue to practise the 2, 5 and 10 multiplication tables)
- Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one digit numbers, using mental maths and progressing to a formal written method

Continue to use practical resources, pictures, diagrams, number lines, arrays and the ÷ sign to record, using multiples that they know, as appropriate (see stage 3 guidance).

On Word ÷ sign
NumLock on, Press down Alt then 0247
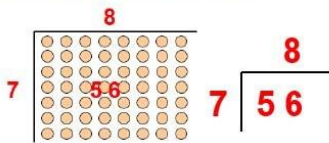
Concrete	Pictoral	Abstract
Use ideas from previous stages using 3,4,8x tables to 12x	Use ideas from previous stages using 3,4,8x tables to 12x	Using an empty number line to count forwards: $24 ÷ 3 = 8$ 'How many threes are in 24?'

Pictoral:

Abstract:

0   3   6   9   12   15   18   21   24

'How many groups of three in 24?'

Introduce the formal layout using multiplication/division facts that the pupils know:
$24 ÷ 3 = 8$

This can also be written: (Bus Stop Method)

$$\frac{8}{3 \, | \, 24}$$

'Twenty four divided by three equals eight.'   'How many threes are there in twenty four?'
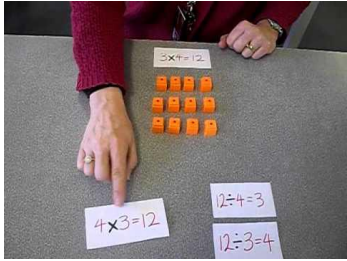
X ÷ Fact families

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

32 ÷ 4

8

Created with Doceri

Multiplication-Divison Facts

72

8   9

'Bar' method

? ? ? ?
24

Arrays

15 ÷ 3 = 5

15 ÷ 5 = 3
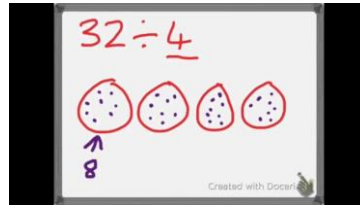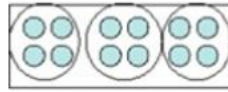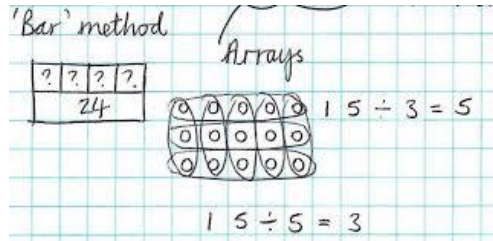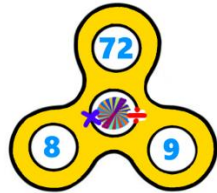
Find the inverse of multiplication and division sentences by creating four linking number sentences.

$36 \div 3 = 12$

30   6

7 x 4 = 28
4 x 7 = 28
28 ÷ 7 = 4
28 ÷ 4 = 7

$30 \div 3 = 10$ $6 \div 3 = 2$

"4 x 3 is 12, so
12 ÷ 3 = 4."

Vocabulary
Share, sharing, share them out, groups, halves, half, divide, groups of, groups, equally, equal, the same, divide, ÷,

Links to Other Strands
Fractions
Solving problems with familiar contexts
Measuring and scaling up and down
Commutative Law and Inverse

Numicon/Number Links
Recognise, make, label 2 digit numbers
Use correct terminology for tens and ones
Skip counting
Making 2 digit numbers with plates then moving onto base
manipulate as you use bigger numbers.

29

10 as its easier to

| | Always start with numicon when modelling a new concept, and then move onto either base ten or place value counters to support visually with more abstract concepts

Remember numicon can still be used for problem solving, doubling,
Ensure children understand the value of these numbers and use the right terminology for ones and tens. |
|---|---|

Calculation Guidance – Division Stage 5
"When you divide, the number gets smaller"

- Recall multiplication and division facts for multiplication tables up to 12 × 12
- Use place value, known and derived facts to divide mentally
- Divide two-digit and three-digit numbers by a one-digit number using formal written layout (not explicitly stated in the programmes of study but implied in the non-statutory guidance)

NB Remainders are not specifically referred to until Year 5 in the National Curriculum. However, this may be an appropriate point to introduce them using familiar multiplication facts.
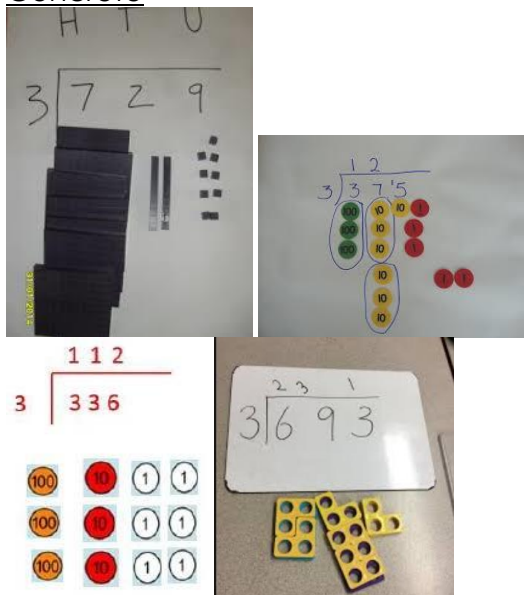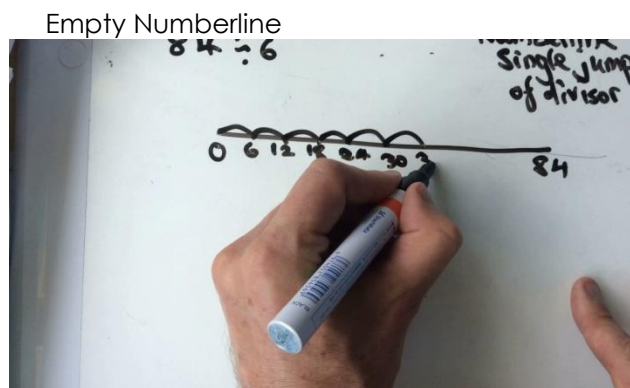
Concrete	Pictoral	Abstract
	Empty Numberline 	See use of abstract written method alongside concrete methods in concrete column. Continue to write and calculate mathematical statements for division using the multiplication tables that the pupils know e.g. $32 \div 8 = 4$ Continue using the formal written layout for division using multiplication tables that pupils know: (Bus stop method) $$\frac{\quad 4 \quad}{8 \mid 32}$$ 'How many eights are there in 32?' Continue using the formal written layout, introducing remainders: $25 \div 3 = 8 \, r1$

20 ÷ 3 = 6r2

20 ÷ 5 = 4

20 ÷ 8 = 2r4

20 ÷ 7 = 2r6
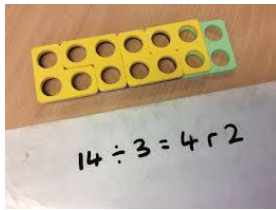
14 ÷ 3 =
Divide objects between groups and
see how much is left over

14 ÷ 3 = 4 r 2
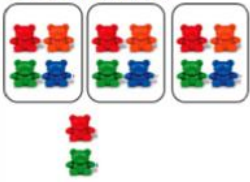
Jump forward in equal jumps on a number line
then see how many more you need to jump to
find a remainder.

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

10s   1s
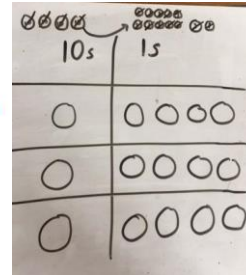
42 divided by 3 (using   partitioning)

$\frac{8}{2 | 25}$ r1

48 ÷ 9 = 5r3

45   3

5   r 3

I know that
6÷3=2, so
600÷3=2.

3 2
6 | 19 ¹2
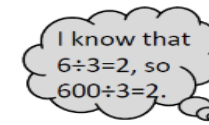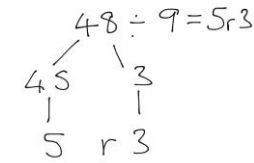
192 ÷ 6
= 32

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.
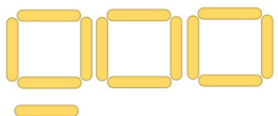
There are 3 whole squares, with 1 left over.

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.
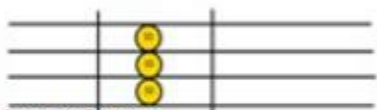
have 1 ten left over.
We exchange this ten for ten ones and then share the ones equally among the groups.
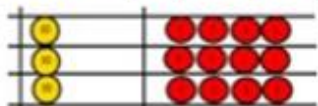
We look how much in 1 group so the answer is 14.

Vocabulary
Share, sharing, share them out, groups, halves, half, divide, groups of, groups, equally, equal, the same, divide, ÷,

Links to Other Strands
Fractions
Solving problems with familiar contexts
Measuring and scaling up and down
Commutative Law and Inverse

Numicon Links

Pattern Seeking in the number system	making 2 digit numbers with plates then moving onto base 10 as its easier to manipulate as you use bigger numbers.
	Always start with numicon when modelling a new concept, and then move onto either base ten or place value counters to support visually with more abstract concepts
	Remember numicon can still be used for problem solving, doubling, Ensure children understand the value of these numbers and use the right terminology for ones and tens.

Pre-Key Stage 1 Standards – Maths

	The pupil can:			
Standard 1	• demonstrate an understanding of the concept of transaction (e.g. by exchanging a coin for an item, or one item for another, during a role-play activity)			
	• distinguish between 'one' and 'lots', when shown an example of a single object and a group of objects			
	• demonstrate an understanding of the concept of 1:1 correspondence (e.g. giving one cup to each pupil).			

	The pupil can:			
Standard 2	• identify the big or small object from a selection of two			
	• sort objects according to a stated characteristic (e.g. group all the small balls together, sort the shapes into triangles and circles)			
	• say the number names to 5 in the correct order (e.g. in a song or by joining in with the teacher)			
	• demonstrate an understanding of the concept of numbers up to 5 by putting together the right number of objects when asked			
	• copy and continue simple patterns using real-life materials (e.g. apple, orange, apple, orange, etc.).			

	The pupil can:			
Standard 3	• identify how many objects there are in a group of up to 10 objects, recognising smaller groups on sight and counting the objects in larger groups up to 10			
	• demonstrate an understanding that the last number counted represents the total number of the count			
	• use real-life materials (e.g. apples or crayons) to add and subtract 1 from a group of objects and indicate how many are now present			
	• copy and continue more advanced patterns using real-life materials (e.g. apple, apple, orange, apple, apple, orange, etc.).			

Standard 4	The pupil can:			
	• read and write numbers in numerals from 0 to 9			
	• demonstrate an understanding of the mathematical symbols of add, subtract and equalto			
	• solve number problems involving the addition and subtraction of single-digit numbers up to 10			
	• demonstrate an understanding of the composition of numbers to 5 and a developing ability to recall number bonds to and within 5 (e.g. 2 + 2 = 4 and 3 + 1 = 4)			
	• demonstrate an understanding of the commutative law (e.g. 3 + 2 = 5, therefore 2 + 3 = 5)			
	• demonstrate an understanding of inverse relationships involving addition and subtraction (e.g. if 3 + 2 = 5, then 5 – 2 = 3)			
	• demonstrate an understanding that the total number of objects changes when objects are added or taken away			
	• demonstrate an understanding that the number of objects remains the same when they are rearranged, providing nothing has been added or taken away			
	• count to 20, demonstrating that the next number in the count is one more and the previous number is one less			
	• recognise some common 2-D shapes.			

BSquared Sections

Number (Calculation)

Geometry and Measure

Probability and Statistics

Pre-Key Stage 2 Standards – Maths

Standard 1	The pupil can:			
	• demonstrate an understanding of the concept of transaction (e.g. by exchanging a coin for an item, or one item for another, during a role-play activity)			
	• distinguish between 'one' and 'lots', when shown an example of a single object and a group of objects			
	• demonstrate an understanding of the concept of 1:1 correspondence (e.g. giving one cup to each pupil).			

Standard 2	The pupil can:			
	• identify the big or small object from a selection of two			
	• sort objects according to a stated characteristic (e.g. group all the small balls together, sort the shapes into triangles and circles)			
	• say the number names to 5 in the correct order (e.g. in a song or by joining in with the teacher)			
	• demonstrate an understanding of the concept of numbers up to 5 by putting together the right number of objects when asked			
	• copy and continue simple patterns using real-life materials (e.g. apple, orange, apple, orange, etc.).			

Standard 3	The pupil can:			
	• identify how many objects there are in a group of up to 10 objects, recognising smaller groups on sight and counting the objects in larger groups up to 10			
	• demonstrate an understanding that the last number counted represents the total number of the count			
	• use real-life materials (e.g. apples or crayons) to add and subtract 1 from a group of objects and indicate how many are now present			
	• copy and continue more advanced patterns using real-life materials (e.g. apple, apple, orange, apple, apple, orange, etc.).			

	The pupil can:			
Standard 4	• read and write numbers in numerals from 0 to 9			
	• demonstrate an understanding of the mathematical symbols of add, subtract and equal to			
	• solve number problems involving the addition and subtraction of single-digit numbers up to 10			
	• demonstrate an understanding of the composition of numbers to 5 and a developing ability to recall number bonds to and within 5 (e.g. 2 + 2 = 4 and 3 + 1 = 4)			
	• demonstrate an understanding of the commutative law (e.g. 3 + 2 = 5, therefore 2 + 3 = 5)			
	• demonstrate an understanding of inverse relationships involving addition and subtraction (e.g. if 3 + 2 = 5, then 5 − 2 = 3)			
	• demonstrate an understanding that the total number of objects changes when objects are added or taken away			
	• demonstrate an understanding that the number of objects remains the same when they are rearranged, providing nothing has been added or taken away			
	• count to 20, demonstrating that the next number in the count is one more and the previous number is one less			
	• recognise some common 2-D shapes.			

	The pupil can:			
Standard 5 (working towards the KS1 expected standard)	• read and write numbers in numerals up to 100			
	• partition a two-digit number into tens and ones to demonstrate an understanding of place value, though they may use structured resources to support them			
	• add and subtract two-digit numbers and ones, and two-digit numbers and tens, where no regrouping is required, explaining their method verbally, in pictures or using apparatus (e.g. 23 + 5; 46 + 20; 16 − 5; 88 − 30)			
	• recall at least four of the six number bonds for 10 and reason about associated facts (e.g. 6 + 4 = 10, therefore 4 + 6 = 10 and 10 − 6 = 4)			

• count in twos, fives and tens from 0 and use this to solve problems			
• know the value of different coins			
• name some common 2-D and 3-D shapes from a group of shapes or from pictures of the shapes and describe some of their properties (e.g. triangles, rectangles, squares, circles, cuboids, cubes, pyramids and spheres).			

	The pupil can:			
Standard 6 (working at the KS1 expected standard)	• read scales in divisions of ones, twos, fives and tens			
	• partition any two-digit number into different combinations of tens and ones, explaining their thinking verbally, in pictures or using apparatus			
	• add and subtract any 2 two-digit numbers using an efficient strategy, explaining their method verbally, in pictures or using apparatus (e.g. 48 + 35; 72 – 17)			
	• recall all number bonds to and within 10 and use these to reason with and calculate bonds to and within 20, recognising other associated additive relationships (e.g. If 7 + 3 = 10, then 17 + 3 = 20; if 7 – 3 = 4, then 17 – 3 = 14; leading to if 14 + 3 = 17, then 3 + 14 = 17, 17 – 14 = 3 and 17 – 3 = 14)			
	• recall multiplication and division facts for 2, 5 and 10 and use them to solve simple problems, demonstrating an understanding of commutativity as necessary			
	• identify 1/4, 1/3, 1/2, 2/4, 3/4, of a number or shape, and know that all parts must be equal parts of the whole			
	• use different coins to make the same amount			
	• read the time on a clock to the nearest 15 minutes			
	• name and describe properties of 2-D and 3-D shapes.			

B Squared Areas
Number (Calculation)
Geometry and Measure
Probability and Statistics

AQA Mathematics - Entry Level 1

Component 1:Properties of Number

1.1 Count reliably up to 20 items

1.2 Read, write, order and compare numbers up to 20, including zero
   Say which two numbers is smaller or larger
   Say which of three or more numbers is the smallest or the largest
   Put three or more numbers in order, starting with the smallest

1.3 Complete a number line up to 20

Component 2: The Four Operations

1.1 Add two whole numbers with a total up to 20
   Zero can be one of the numbers
   Key Words - add, sum, total, altogether
   Use the = sign to represent equality

1.2 Subtract one number up to 20 from another
   Zero can be the number subtracted
   Key words - take, take away, subtract, difference, how much more, how much less

1.3 Understand and use the + and – signs to solve simple number problems
   Work out 5 + 11
   6 = 10 - ?
   Understand that subtraction is the inverse of addition

Component 3: Ratio

1.1 Understand equality
   Use and understand the = sign
   2 + 5 = 5 + ?

1.2 Identify or show one half of a quantity up to 20
   Shade half of a shape
   Given a picture of children – What fraction of the children are boys?

1.3 Work out half of an even number up to 20

Component 4: Money

1.1 Recognise coins and notes up to £20
   1p, 2p, 5p, 10p, 20p, 50p, £1, £2 £5, £10, £20
   How much is each coin worth?

1.2 Exchange money up to 20p for an equivelent amount in other denominations
    Show 2 different ways of making 9p

1.3 Add up to 20 coins
   Up to 20p in 1p, 2p, 5p, 10p, 20p coins up tp £20 in £1 and £2 coins
   Jack has these coins – How much does he have?

Component 5: The Calendar and Time

1.1 Know the days of the week and their order
   Key words – today, yesterday, tomorrow, now, before, after, next
   What is the day before Tuesday

1.2 Read the time to the hour or half hour on an analogue clock and draw the hands on a clock to show these times

1.3 Order familiar events
   Put in order – eat dinner, go to school, wake up, leave school, have breakfast

AQA Mathematics – Entry Level 1 Cont...

Component 6: Measures

1.1 Compare lengths, heights, weights and capacities
   Key words: long, longer, short, shorter, tall, taller, heavy, heavier, light, lighter, more, less, most, least

1.2 Give the length of a line drawn on a centimetre grid
   Up to 20cm

1.3 Describe capacity in fractions
   Key words are empty, half full, full
   Tick the jug that is more than half full

Component 7: Geometry

1.1 Recognise and name squares, rectangles, triangles, circles, and cubes
   Drawings may not be accurate, but intention must be clear

1.2 Compare and order a group of shapes or pictures or similar shapes of different size and recognise congruent shapes
   Key words- smaller, smallest, bigger, biggest, large, larger, largest, thinner, thinnest, narrower, narrowest,   wider, widest, longer, longest, shorter, shortest
   Tick the two shapes that are the same.

1.3 Use and understand positional language
   Key words: left, right, between, inside, outside, in the middle, below, under, above, on top of

Component 8: Statistics

1.1 Sort and classify objects using a single criterion
   Shaded/unshaded, round/not round

1.2 Interpret and draw conclusions from a list or group of objects
   How many blue cars were there?
   Which colour was the most popular?

1.3 Construct and interpret simple line graphs
   Including block graphs

AQA Mathematics - Entry Level 2

Component 1: Number

2.1 Read, write, order and compare numbers up to 100
Numbers could be in context
Key words – smaller, larger, less, more, fewer, smallest, largest, least, most, fewest

2.2 Recognise place value in two-digit numbers

2.3 Count from 0 in steps of 3, 2 and 5
Fill in blanks in the list of multiples of 2 up to 24 (36 for 3 and 60 for 5)
The list could be counting up or down

2.4 Round numbers less than 100 to the nearest 10

2.5 Understand and identify odd and even numbers
Write down an even number between 7 and 13

Component 2: The Four Operations

2.1 Add whole numbers with a total to 100

2.2 Subtract one number up to 100 from another

2.3 Multiply using single digits whole numbers
Key words – multiply, multiplication, times, lots of
Understand that multiplication is the same as repeated addition

2.4 Use and interpret +, -, x and = in real situations for solving problems
Dan had some sweets; He ate 13 and had 8 left.
How many did he eat in the first place?

2.5 Recall and use multiplication facts for 2, 5, 20 multiplication tables 2.

Component 3: Ratio

2.1 Identify or show one third or one quarter of a quantity up to 24
Shade one third or one quarter of a shape
Given a picture of children – What fraction of the children are boys?

2.2 Work out one third or one quarter of a number to 24
Without remainders

2.3 Count in fractions of one half or one third or one quarter
Give the next number in the pattern

2.4 Work out amounts two, three or four times the size and given amount
Key words – double, twice, three times, four times as

2.5 Recognise the equivalence of ½ and 3/4

Component 4: Money

2.1 Appreciate the purchasing power of money
If I had a £2 coin, would I have enough to buy a can of pop?
If I had a £2 coin, would I have enough to buy a computer?

2.2 Convert pence to pounds and vice versa
How many pence is £4.30
Write 715 pence in pounds

2.3 Make amounts of money up to £2 with given coins
How can you make £1.65 using only 50p, 20p and 5p coins

2.4 Make amounts of money in multiples of £5 from £5, £10 and £20 notes
How can you make £55 using only £20 and £5 notes?

2.5 Calculate with amounts of money in pence up to £1 and whole pounds to £100 and give change.
Hayley bought 3 chocolate bars for 30p each. How much change should she get from a £1?

AQA Mathematics – Entry Level 2 Cont...

Component 5: The Calendar and Time

2.1 Know the seasons and the months and their order
   What season is it after summer?
2.2 Know that 1 week = 7days, 1 day = 24 hours, 1 hour = 60 mins, 1 minute = 60 seconds

2.3 Read the time displayed on an analogue or 12 hour digital clock in hours, half hours and quarter hours, draw the hands on a clock or the digital display to represent these times
   Students should be able to convert 'quarter past eight' to 8.15 and draw hands on a clock to show this time.
2.4 Read the time to the nearest five minutes on an analogue clock, draw the hands on a clock to show the time, and read any time on a digital clock
2.5 Find the difference between two times given in hours, half hours and quarter hours
   How many minutes are there from 2.45 to 3.15?`

Component 6: Measures

2.1 Choosing appropriate standard units of length, capacity, and weight
   Mm, cm, m, km, g, kg, ml, cl, l
   Which unit would be best to measure the length of a football pitch?
2.2 Compare and order lengths, capacities, and weights in the same units
2.3 Select a possible length, capacity, or weight for a given item
2.4 Measure or draw a length using a ruler
   In whole mm, or whole or half cm
2.5 Estimate the weight, length or capacity of given items
   Given two items, tick the heavier item
   Estimate the weight of a bag of crisps

Component 7: Geometry

2.1 Recognise and name shapes including pentagons, hexagons and octagons and identify a right-angled triangle from a set of triangles
   A right angle will be identifies by a small square
2.2 Recognise and name cuboids, pyramids and spheres
2.3 Describe the properties of 2D shapes, including straight and curved edges
   Number of edges and vertices
2.4 Describe the properties of solid shapes
   Number of edges, vertices and faces
2.5 Understand angle as a measure of turn
   Quarter, half, three quarter, and whole turn, clockwise and anticlockwise

Component 8: Statistics

2.1 Sort and classify objects using more than one criterion
2.2 Collect information by survey
   Ask 10 classmates what their favourite food is
   In the external assessment the student will select the correct question to ask in a survey from a given list
2.3 Record results in lists, tally charts and tables
2.4 Construct and interpret pictograms where one picture is worth one item
2.5 Interpret simple tables, diagrams, lists and graphs
   Given a daily temperature graph for July, find the highest temperature that month

AQA Mathematics - Entry Level 3

Component 1: Number

3.1 Read and write numbers up to 1,000
3.2 Order and compare numbers up to 1,000
3.3 Recognise place value in three digit numbers
In 482, which is the units digit?
3.4 Round numbers less than 1,000 to the nearest 10
3.5 Round numbers less than 1,000 to the nearest 100
3.6 Find 10 or 100 more or less than a given number
3.7 Recognise and use multiples of 2, 3, 4, 5, 8, 10, 50 and 100
Key word: multiple

Component 2: The Four Operations

3.1 Add and subtract using three-digit numbers
3.2 Multiply a two digit whole number by a single digit whole number
3.3 Divide a two digit whole number by a single digit whole number
Key words are divide, division, divided by, share equally, equal groups of
Understand that division is the same as repeated subtraction
Understand that division is the inverse of multiplication
Interpret the remainder in a practical situation
3.4 Use and interpret +, −, x ,÷ and = in real-life situations for solving problems
Could be multi-step Kim bought three packs of 12 eggs. She used 4 eggs on Monday and 5 eggs on
Tuesday. How many eggs did she have left?
3.5 Use inverse operations to find missing numbers
Work out the missing number 35 + ? = 124
3.6 Estimate the answer to a calculation
3.7 Recall and use multiplication facts for the 3, 4 and 8 multiplication tables

Component 3: Ratio

3.1 Identify or show unit fractions up to one tenth of a quantity up to 100
Shade a given unit fraction of a specified grid. Given a picture of children, What fraction of the children are boys?
3.2 Work out unit fractions to one tenth of a number up to 100 Without remainder
3.3 Identify or show any number of thirds, quarters, fifths or tenths of a quantity
Shade a fraction of a shape. Given a picture of children, What fraction of the children are boys?
3.4 Work out any number of thirds, quarters, fifths or tenths of an amount Without remainder
3.5 Recognise and identify equivalent fractions
½ =?/10
3.6 Add and subtract fractions with the same denominator within one whole
3.7 Work out amounts 5, 8 or 10 times the size of a given amount

Component 4: Money

3.1 Appreciate the purchasing power of amounts of money (notes)
If I had a £10 note, would I have enough to buy a bottle of shampoo? If I had a £10 note, would I have enough to buy a motorbike?
3.2 Exchange notes for an equivalent value in coins
Show how can you make £5 using only silver coins
3.3 Use decimal notation for money Understand that £3.20 should not be written as £3.2 or £3.20p
3.4 Interpret a calculator display Understand that 3.2 (in pounds) on a calculator means £3.20

3.5 Solve real life problems involving what to buy and how to pay

Lucy is saving £4.50 each week to buy a mobile phone for £90. How many weeks will she have to save?

3.6 Add amounts of money and give change

Adam buys three computer games for £29.99 each and two for £14.99 each. How much does he spend altogether?

3.7 Carry out investigations involving money

AQA Mathematics – Entry Level 3 Cont…

Component 5: The Calendar and Time

3.1 Solve problems involving time

Mohammed got on the bus at 10 o'clock. His journey lasted 45 minutes. What time did he get off the bus?

3.2 Know that there are 365 days in a year, 366 days in a leap year, 12 months in a year and 52 full weeks in a year

3.3 Use a calendar and write the date correctly (day/month/year)

Given a calendar, *What is the date of the first Friday in January? How many days are there in October?*

3.4 Tell and write the time from an analogue clock, including using Roman numerals from I to XII

3.5 Understand and use the 12 hour and 24 hour clock systems and convert from one system to the other

Key words are noon, morning, afternoon, evening and midnight

Write 2pm in the 24 hour clock system

3.6 Convert between hours, minutes and Seconds

Change 250 minutes into hours and minutes

3.7 Add up to three lengths of time given in minutes and hours Shown part of a TV guide,

How long do 'Emmerdale, Coronation Street and Britain's Got Talent last altogether?

Component 6: Measures

3.1 Add lengths, capacities and weights and compare the total to another total or a requirement

3.2 Convert standard units of length, capacity and weight

How many kg is 2500 g?

Change 410 cm into cm and mm

3.3 Compare and order lengths, capacities and weights in different standard units

Which is longest, 4.2 m, 395 cm or

4050 mm?

3.4 Measure the perimeter of a simple shape

3.5 Choose an appropriate measuring instrument

3.6 Read values from an appropriate scale

Read off a number line

3.7 Read and compare temperature including temperature with negative

Component 7: Geometry

3.1 Recognise and name prisms, cylinders and cones

3.2 Draw lines of symmetry on shapes or pictures Including real life items such as road signs

3.3 Recognise and draw nets of cubes and cuboids

3.4 Identify whether an angle is less or more than a right angle

3.5 Identify horizontal, vertical and parallel lines

3.6 Denote the position of a point on a grid by its coordinates or identify a point or item given its coordinates

3.7 Use North (N), East (E), South (S) and West (W) to give directions or position from a map

Component 8: Statistics
3.1 Construct and interpret bar charts with the vertical axis scaled in ones or twos
3.2 Construct and interpret pictograms where one picture represents more than one item
3.3 Extract numerical information from lists, tables, diagrams and charts Including timetables, holiday brochures, sports results etc.
3.4 Complete a frequency table given the original list of results
3.5 Complete a tally chart and the resulting frequency table
3.6 Compare two or more diagrams Given bar charts for attendances at two youth clubs for a week,
Which youth club had more people on Monday?
3.7 Solve one-step and two-step problems based on statistical information
Given daily temperature graphs for July and August, find how much higher the highest temperature was in July than in August.

Calculation Policy Rationale

This calculation policy has been written in line with the programmes of study taken from the revised National Curriculum for Mathematics (2014). It provides guidance on appropriate calculation methods and progression. The content is set out in stages under the following headings: addition, subtraction, multiplication and division. Statements taken directly from the programmes of study are listed in bold at the beginning of each section.

Pupils will, firstly, use mental methods, but for calculations that they cannot do in their heads, they will need to use an efficient written method accurately and with confidence.

When a new concept is introduced there will be a Concrete, Pictorial and then Abstract approach to teaching.

AIMS OF THE POLICY

- To ensure consistency and progression in the school's approach to calculation and place value
- To ensure that pupils develop an efficient and reliable method for practical calculations and those more able learners progress to develop formal written method of calculation for all operations
- To ensure that pupils can use these methods accurately with confidence and understanding

HOW TO USE THIS POLICY

- The policy should be used as part of planning process
- If, at any time, pupils are making significant errors, the previous stage in calculation should be re-visited
- Suitable resources, models, images and methods of communication within a Total Communication environment to support pupils understanding of calculation and place value, as appropriate, should be used
- The policy should be used in conjunction with the Maths Glossary from the NCETM and our Maths Schemes of Work – The White Rose, Our Villa Real Sensory Scheme of Work and Numicon Teaching guides

Maths Glossary - http://ncetm.org.uk/public/files/17308038

- This document can also be used to support non-specialist school staff to improve subject knowledge.