Dore Primary School

Maths Calculation Policy

Latest revision: May 2023

Contents

We respect the UN Convention on the Rights of the Child.

Article 28: We have the right to a good quality education.

Introduction

This calculation policy provides an overview of calculation methods taught in Dore Primary School.

Foundation Stage

"Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically."

(Development Matters, DfE 2021)

This section outlines the endpoints that children work towards in Foundation Stage as they develop their understanding of number and begin to learn how to count. At Dore Primary School, the Development Matters[1] framework is followed by teachers in Foundation Stage alongside the White Rose Maths curriculum to ensure that rich opportunities are created for children to explore and investigate number, spot patterns and make learning connections.

Year 1 – 6

This section outlines the concrete, pictorial and abstract methods for each of the four main operations (addition, subtraction, multiplication and division) alongside key vocabulary. Each part includes objectives from the Chris Quigley Milestones which link directly to the National Curriculum mathematics programme of study[2].

At Dore Primary School, the White Rose Maths[3] framework is followed by all teachers to support with the planning and delivery of quality maths lessons.

The aim of this approach is to:

- support children's ability to make links and connections between mathematical concepts,
- Develop children's reasoning and problem solving skills
- Increase children's fluency of number fact recall.

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1007446/6.7534_DfE_Development_Matters_Report_and_illustrations_web__2_.pdf
[2] https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study
[3] https://whiterosemaths.com

What are concrete, pictorial and abstract?

"If we do not use concrete manipulations, then we cannot understand mathematics. If we only use concrete manipulations, then we are not doing mathematics."[4]

Gu (2015)

Concrete – Children use practical apparatus such as base 10, place value counters, Cuisenaire rods, Numicon and plastic coins to complete calculations. The main focus is to investigate new concepts and ideas, develop an understanding of the place value of numbers and recognise links to prior learning.

Pictorial – Children draw images of practical apparatus to encourage them to begin developing mental pictures of calculations and visualise the calculation. Children make links between concrete and abstract representations.

Abstract – Children represent prior learning using mathematical symbols. They consolidate the understanding formed through concrete and pictorial investigation and use digits and symbols to represent calculations.

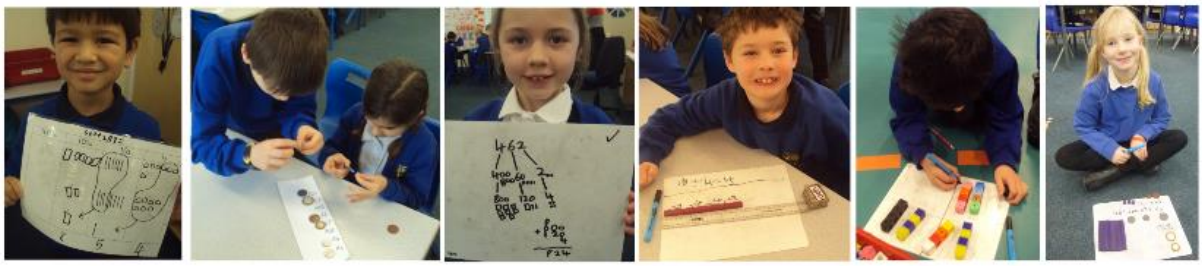
How does concrete, pictorial and abstract impact children's learning?

- Children show better retention rates of new concepts when they are introduced using practical apparatus compared to just using abstract symbols[5]
- Using practical apparatus reduces cognitive demand on pupils[6]
- Children develop a deeper understanding of concepts[7]
- Using concrete and pictorial images reduces an overreliance on mathematical rules and encourages a deeper understanding of concepts[8]
- Using practical apparatus address and overcome children's misconceptions about mathematical concepts[9]

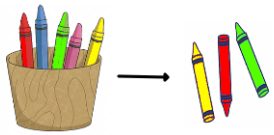
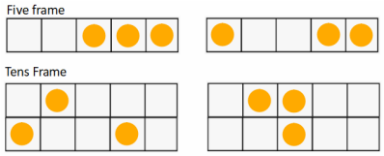
[4] https://www.tes.com/teaching-resource/the-importance-of-concrete-professional-development-11476476
[5] Carbonneau, Marley and Selig 2013(https://nrich.maths.org/10461)
[6] Chinnappan and Chandler 2010 (http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1146&context=edupapers)
[7] Ofsted 2012 (https://www.gov.uk/government/publications/mathematics-made-to-measure)
[8] NCETM 2013(https://nrich.maths.org/10461)
[9] Drews 2007 (http://www.xtec.cat/centres/a8005072/articles/resources.pdf)

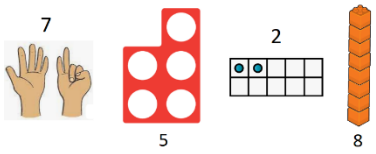
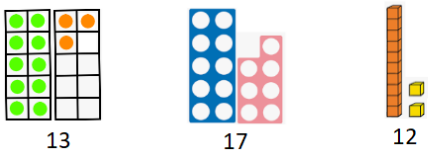
What are the maths non-negotiables?

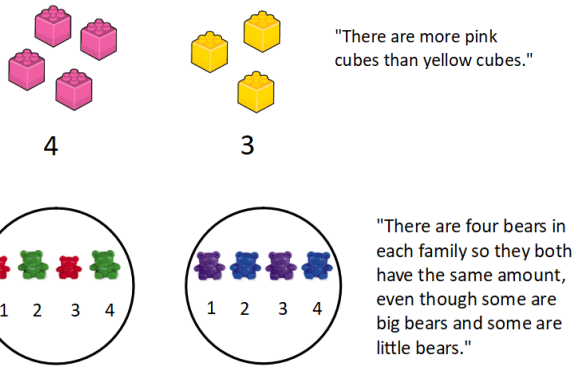
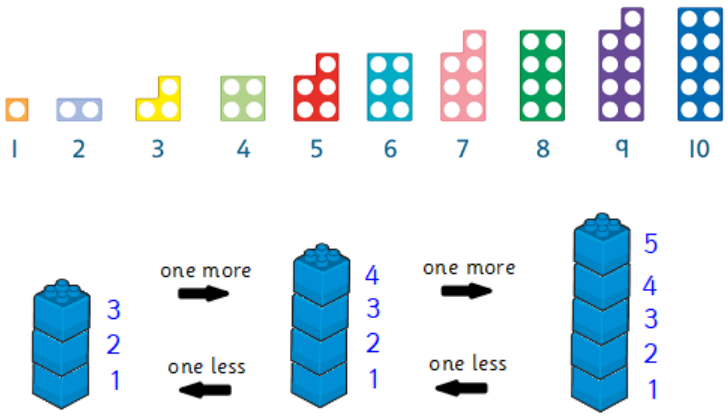
The maths non-negotiables are key recall facts which are taught in each year group to support children's maths fluency. At Dore Primary School, children are encouraged to look carefully at questions in order to choose the most efficient method for solving calculations. Developing number fluency allows children to use mental methods to calculate, thus reducing cognitive load and increasing efficiency. In addition to regularly being practised during maths lessons, these recall facts are taught and revised throughout the day as part of classroom routines such as during classroom transitions.

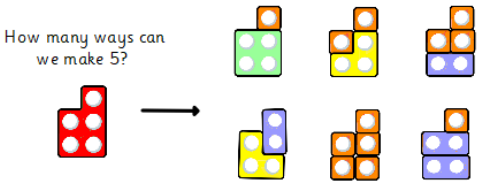
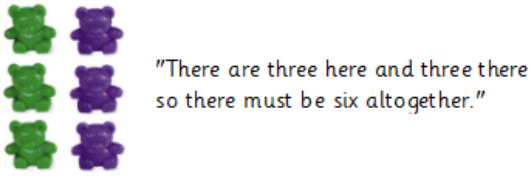
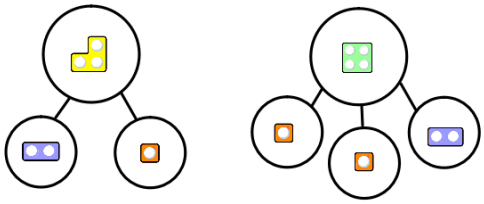


Foundation Stage

End points: *(Development Matters, DfE 2021)*	Small steps:
Count objects, actions and sounds	Children count objects by matching one number name to each item.  Children understand that the last number counted is the total number in the group. This is called the cardinal counting principle.  We finished on number five, so there are five altogether." Children count out a smaller number from a larger group and demonstrate the cardinal principle of knowing when to stop. "Please could you pass three crayons?"  "One...Two...Three..." Classroom examples: • Count in routines throughout the day such as lining up, timers for tidying up and counting out pieces of snack. • Read and sing stories, songs and rhymes that include counting. • Play games which include counting e.g. rolling a dice and moving a counter forward a set number of jumps.
Subitise	Children recognise small quantities in familiar patterns.  Children become familiar with the tens structure of the number system.  Children are prompted to subitise first when enumerating groups of up to five objects then count to check. "They are arranged in a square shape so there must be four. Let's count together and check." 

	Classroom examples: • Play games involving revealing and hiding numbers of objects. • Arrange objects in five frames and then tens frames. • Encourage children to show a number of fingers all at once rather than counting them.
Link the number symbol to its cardinal number value	Children begin to link numerals to concrete resources or pictorial images that show the number's cardinal value.  Classroom examples: • Display numerals in order alongside dots, tens frame arrangements and Numicon. • Play games such as snap or dominoes where children match numerals to dot arrangements. • Discuss different ways that children might record quantities such as tallies, dots and numerals.
Count beyond 10	Children spot patterns in ordered numbers above 10. **21...22...23...24...25...** Children become familiar with concrete and pictorial representations of numbers from 10 to 20.  Classroom examples: • Counting is included in routines throughout the day such as lining up, timers for tidying up and counting out pieces of snack. • Count together the number of children who have selected different lunch options during the register. • Count verbally above 20 and emphasise the multiples of ten to enable children to recognise the structure.

Compare numbers	Children begin to use comparison vocabulary: 'more than', 'less than', 'fewer', 'the same as', 'equal to'.  Classroom examples: • Use loose parts pieces to group items and compare amounts. Vary the size of items and how spread out they are in order to show that it is the number of objects being compared and not their size or space taken. • Distribute items equally such as "Put three shells in each bag". Deliberately make mistakes to provoke discussion about who has more and less. • Encourage children to share out resources such as construction bricks to ensure that everyone has the same.
Understand the 'one more than/one less than' relationship between consecutive numbers	Children recognise that the order of numbers in the counting sequence is related to the size of the numbers.  Classroom examples: • Make predictions about what the outcome will be in stories, rhymes and songs if one is added, or if one is taken away. • Count objects then add or take one away and count again. • Build towers of bricks, adding one more extra brick to each new tower.

Explore the composition of numbers to 10	Children understand the composition of numbers 2, 3, 4 and 5  Conceptual subitising is modelled to children  Children recognise that two or more parts make a whole.  Classroom examples: • Use concrete and pictorial representations to show the composition of numbers. E.g. fingers, dice, dominoes, ten frame • Emphasise the parts within the whole: "There were 8 water bottles in the tray altogether. Two have been collected and 6 have not been collected yet." • Play games which involve partitioning and recombining sets. For example, throw 5 beanbags, aiming for a hoop. How many go in and how many don't?

Addition

Key vocabulary:

addition **increase** **more** **sum** **count on** **altogether**

plus **total** **make** **add**

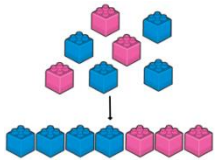
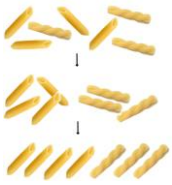
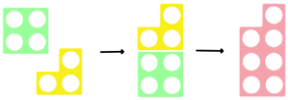
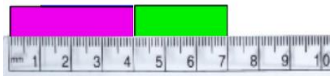
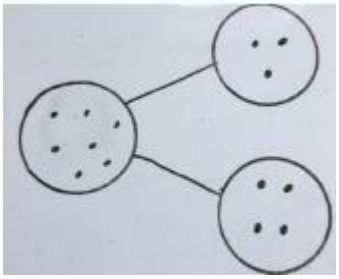
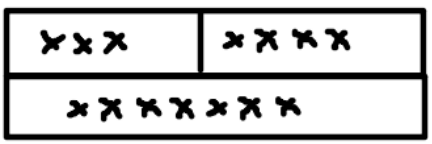
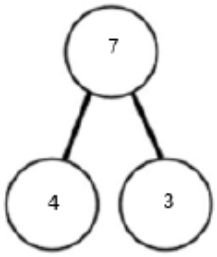
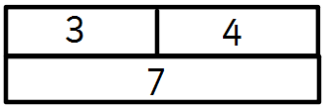
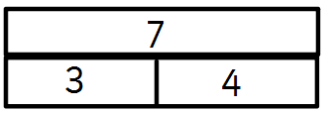
Y1 (Milestone 1 Basic)

- Use concrete objects and pictorial representations to solve addition calculations.
- Begin to recognise numbers can be added in any order.

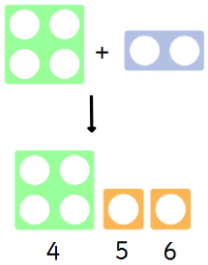
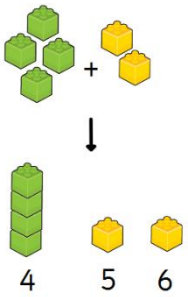
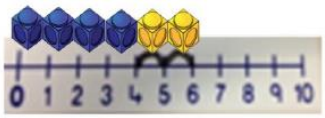
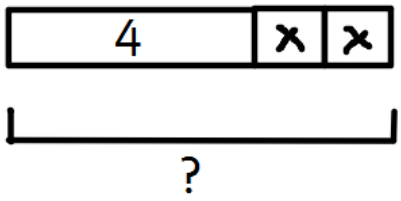
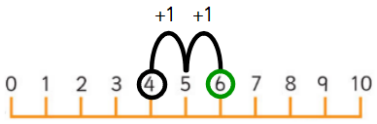
Y2 (Milestone 1 Advancing)

- Solve one step problems using 2 digit numbers.
- Know numbers can be added in any order.
- Add 2 two digit numbers together.

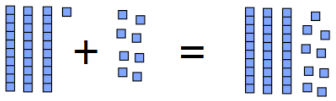
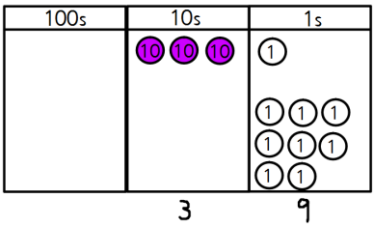
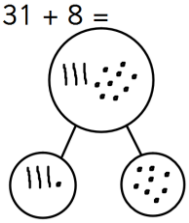
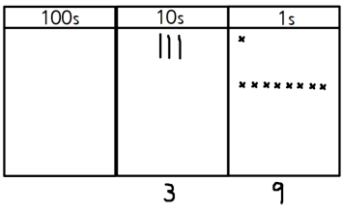
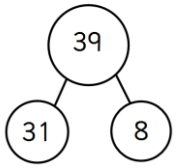
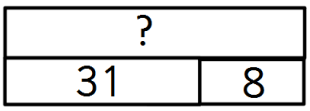
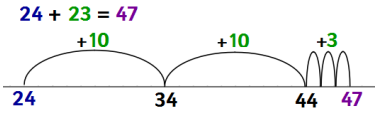
Combining two parts to make a whole

Concrete	Pictorial	Abstract
Multilink cubes  Adding objects  Numicon  Cuisenaire rods 	Drawing crosses  Part whole model  Bar model 	 3 + 4 = 7 4 + 3 = 7  

Adding using counting on

Concrete	Pictorial	Abstract
Numicon  Multilink cubes  or  Cuisenaire rods  	Drawing  Bar model  	 What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2 =

Adding to a 2 digit number

Concrete	Pictorial	Abstract
Numicon 31 + 8 =  Using the base 10 31 + 8 =  Using the place value counters 31 + 8 =  	Drawing base 10 31 + 8 =  31 + 8 =  	Part-whole model 31 + 8 =  Bar model  1 + 8 = 9 30 + 9 = 39 Blank number line 

Y3 (Milestone 2 Basic)

- Add numbers up to 3 digits using the column method.
- With support, add mentally up to 3 digit numbers (e.g. 3 digit + ones; 3 digit + tens; 3 digit + hundreds).

Y4 (Milestone 2 Advancing)

- Add numbers up to 4 digits using the column method.
- Confidently add mentally up to 3 digit numbers (e.g. 3 digit + ones; 3 digit + tens; 3 digit + hundreds).

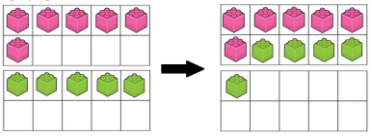
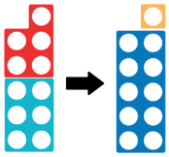
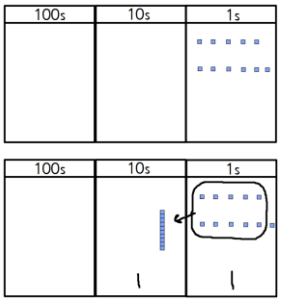
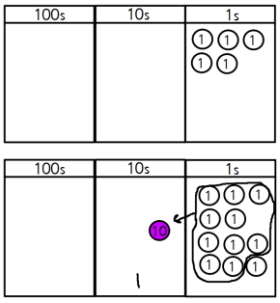
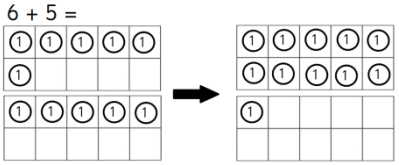
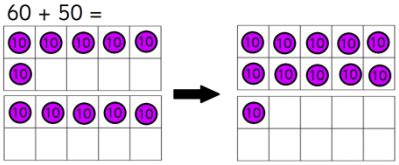
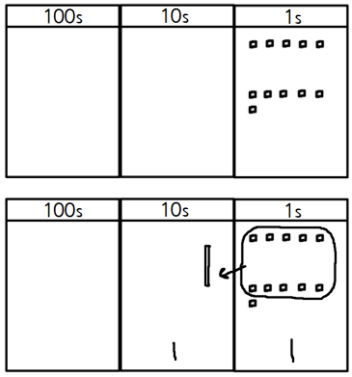
Y5 (Milestone 3 Basic)

- With support, add numbers up to 5 digits using the column method and round to check answers.
- With support, add 3 digit numbers mentally.

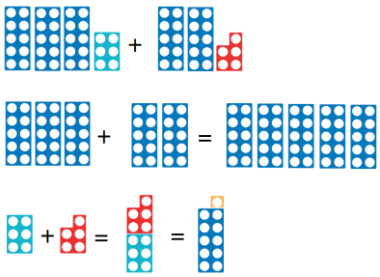
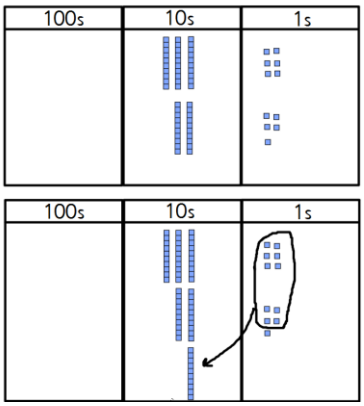
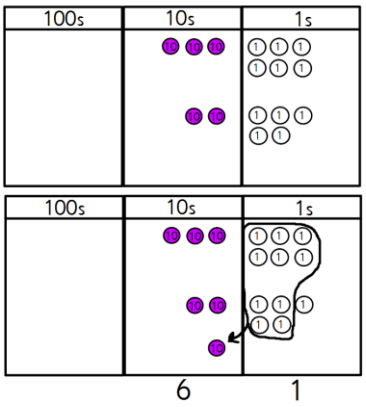
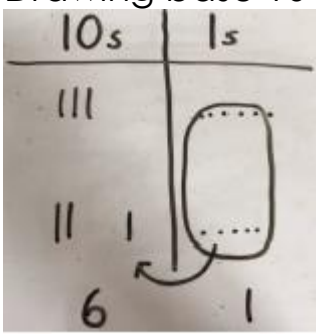
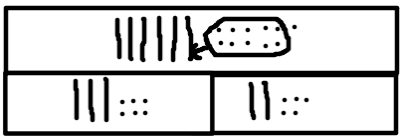
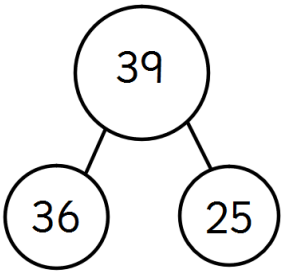
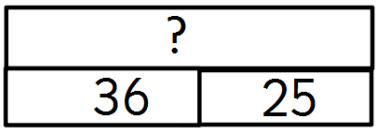
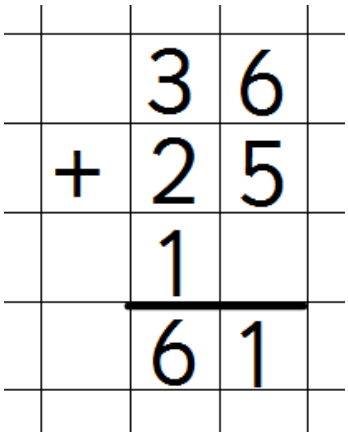
Y6 (Milestone 3 Secure)

- Add and subtract numbers larger than 3 digits mentally.

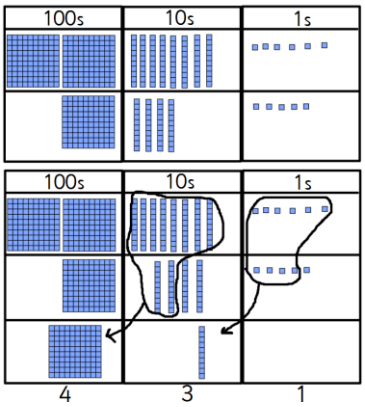
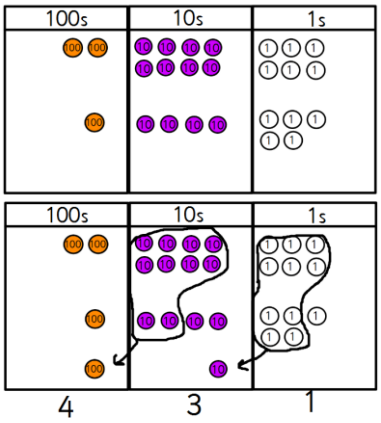
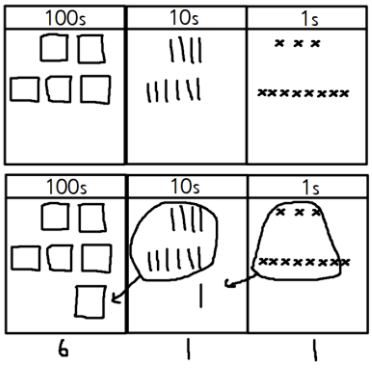
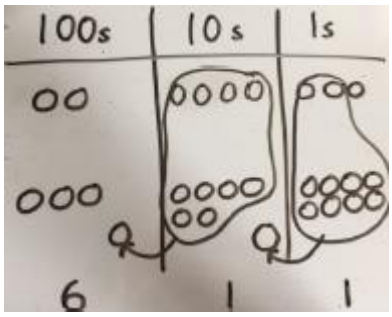
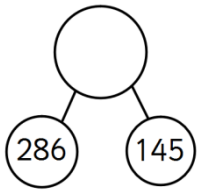
Regrouping to make 10

Concrete	Pictorial	Abstract
Multilink cubes and tens frame 6 + 5 =  Numicon 6 + 5 =  Using the base 10 6 + 5 =  Using the place value counters 6 + 5 =  Cuisenaire rods  6 + 5 = 6 + 4 + 1 = 10 + 1 = 11	Place value counters and tens frame 6 + 5 =  60 + 50 =  Drawing base 10 6 + 5 = 	6 + 4 = 10 so 6 + 5 = 11 6 + 5 = 6 + 4 + 1 6 + □ = 11 6 + 5 = 5 + □ 6 + 5 = □ + 4

Adding TO + TO (2 digit number + 2 digit number) with regrouping

Concrete	Pictorial	Abstract
Numicon 36 + 25 =  Using the base 10 36 + 25 =  Using the place value counters 36 + 25 = 	Drawing base 10  Bar modelling 	36 + 25 =   6 + 5 = 5 + 5 + 1 = 11 30 + 20 = 50 50 + 11 = 50 + 10 + 1 = 61 

Adding HTO + HTO (3 digit number+3 digit number) with regrouping

Concrete	Pictorial	Abstract
Using the base 10 286 + 145 =  Using the place value counters 286 + 145 =  	Drawing base 10 243 + 368 =  Drawing counters 243 + 368 =  	286 + 145 =  Missing numbers: ? / 286 | 145 ☐ - 286 = 145 ☐ = 286 + 145 Formal method h t o 2 8 6 + 1 4 5 1 1 2 8 6 + 1 4 5 1 1 3 1 2 8 6 + 1 4 5 1 1 4 3 1

Y5 (Milestone 3 Basic)

- With support, add negative numbers

Y6 (Milestone 3 Secure)

- Add 6 digit numbers with decimals using written formal methods and round to check answers.

Subtraction

Key vocabulary:

subtraction **difference between** **fewer** **reduce** **decrease**

take away **less** **minus** **subtract**

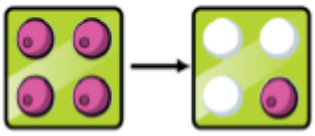
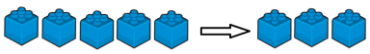
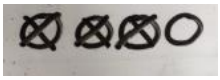
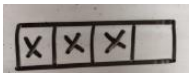
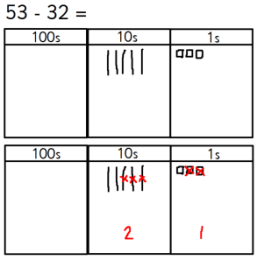
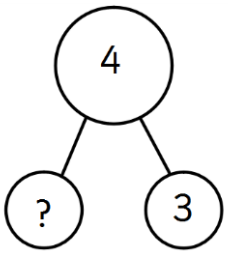
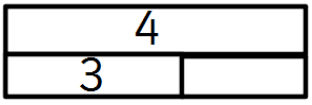
Y1 (Milestone 1 Basic)

- Use concrete objects and pictorial representations to solve subtraction calculations.
- With support, beginning to understand addition and subtraction as inverse functions.

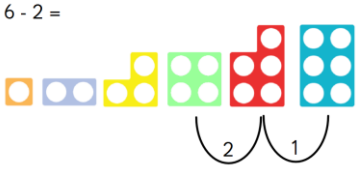
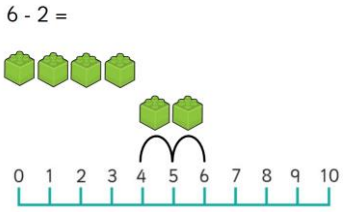
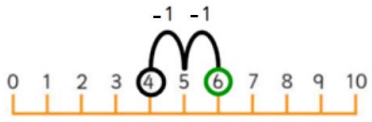
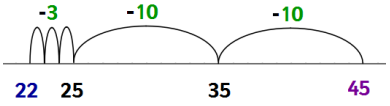
Y2 (Milestone 1 Advancing)

- Solve one step problems using 2 digit numbers.
- Subtract a two digit number from another two digit number when no regrouping is required
- Use knowledge of inverse operations to solve missing number problems.

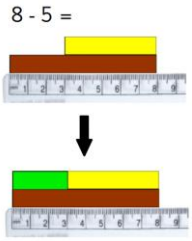
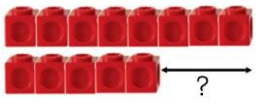
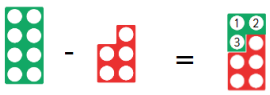
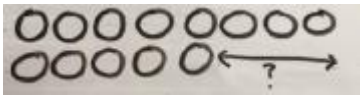
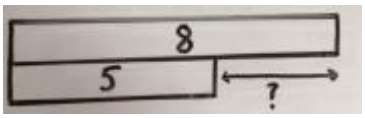
Taking away objects from a whole by removing objects

Concrete	Pictorial	Abstract
Numicon (and balls of play dough) 4 - 3 = 1  Multilink cubes 5 - 2 =  Any other counting resources can be used in the same way e.g. pasta, compare bears, base 10…)	Drawing counters and crossing out 4 – 3 =  Bar model, crossing out to take away 4 – 3 =  Drawing base 10 53 - 32 =  	4 – 3 = ☐ ☐ = 4 – 3  

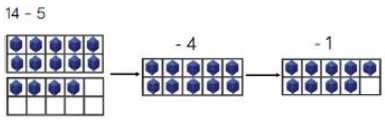
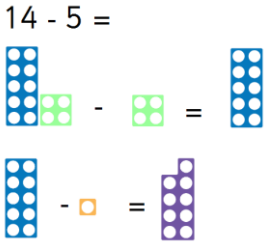
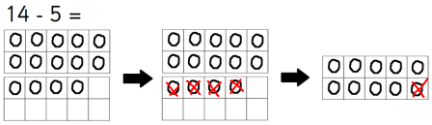
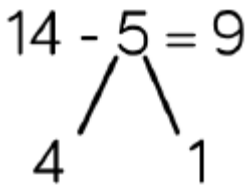
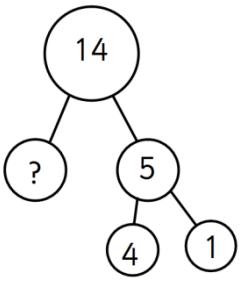
Counting back

Concrete	Pictorial	Abstract
Numicon 6 - 2 =  Multilink cubes 6 - 2 =  Cuisenaire rods 6 - 2 = 	Bar model  	  What is 2 less than 6? What is 6 subtract 4? 6 – 2 = Blank numberline 45 - 23 = 22 

Finding the difference

Concrete	Pictorial	Abstract
Cuisenaire rods 8 - 5 =  Multilink cubes 8- 5 =  Numicon 8 - 5 =  	Draw counters  Bar model  	Find the difference between 8 and 5. Why do 9 – 6 and 8 – 5 have the same difference? What will the difference between 7 and 4 be? What patterns can you recognise?

Counting back to the nearest 10

Concrete	Pictorial	Abstract
Cubes and tens frame  Compare bears  Numicon  	Drawing counters in tens frames  	  14 – 5 = 14 – 4 – 1 = 14 – 4 = 10 10 – 1 = 9

Y3 (Milestone 2 Basic)

- Subtract numbers up to 3 digits using the column method.
- With support, subtract mentally up to 3 digits.
- Estimate the answer to a calculation and use the inverse to check answers.
- With support, solve missing number problems using complex addition and subtraction.

Y4 (Milestone 2 Advancing)

- Subtract numbers up to 4 digits using the column method.
- Confidently, subtract mentally up to 3 digit numbers.
- Confidently estimates the answer to a calculation and use the inverse to check answers.
- Solve missing number problems using complex addition and subtraction.

Y5 (Milestone 3 Basic)

- With support, subtract up to 5 digits using the column method and round to check answers.
- With support, mentally subtract 3 digit numbers.

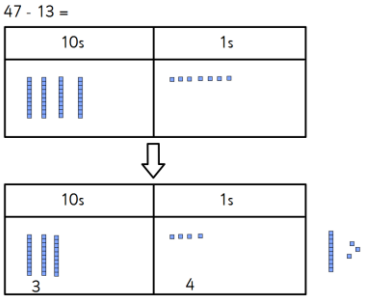
Y6 (Milestone 3 Secure)

- Subtract up to 6 digit numbers using the column method and round to check answers.
- Mentally subtract numbers larger than 3 digits.

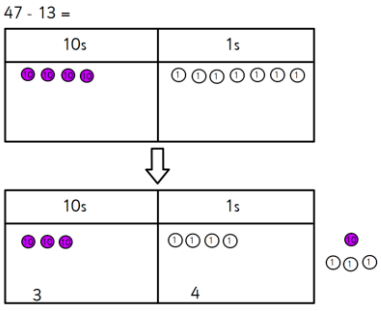
Subtracting using the column method (no exchange)

Concrete

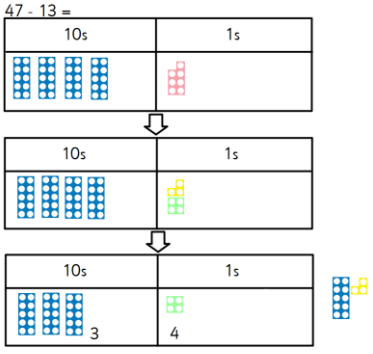
Using the base 10



Using the place value counters

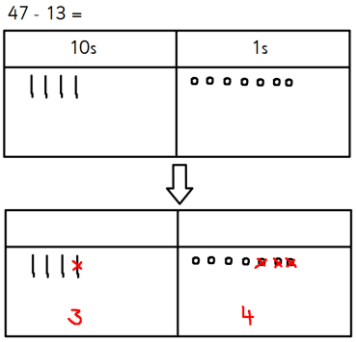


Using the Numicon

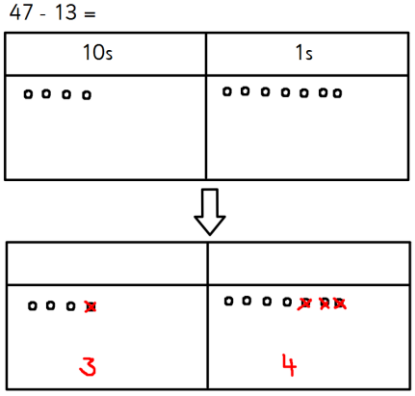


Pictorial

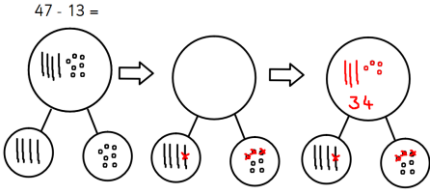
Drawing base 10



Drawing counters

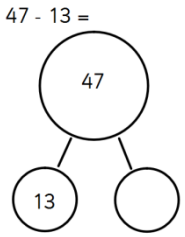


Part-whole model

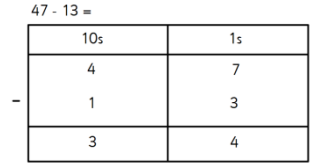


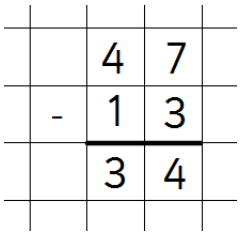
Abstract

Part whole model

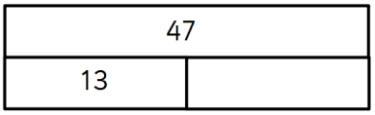


Column subtraction





Bar model



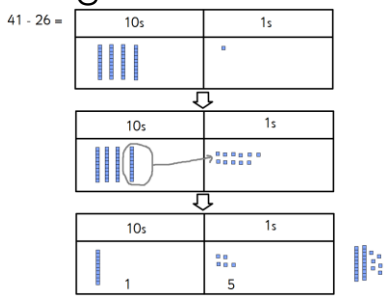
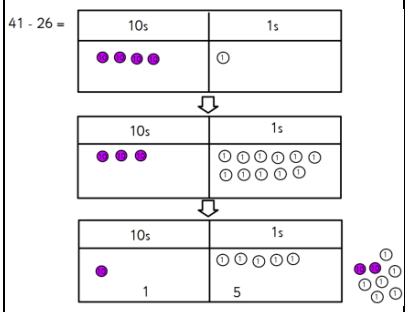
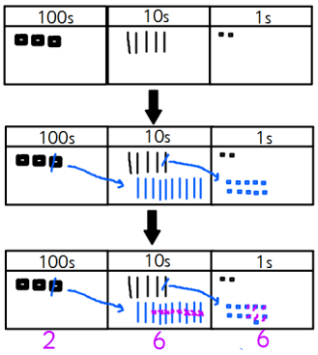
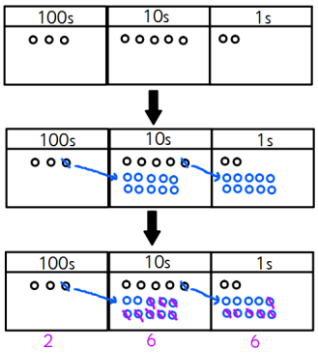
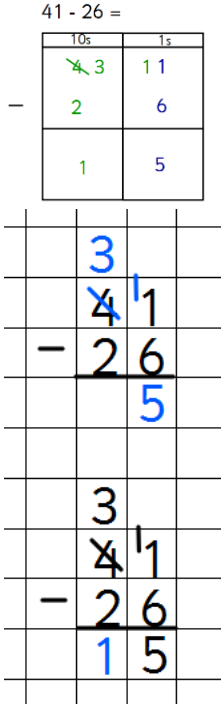
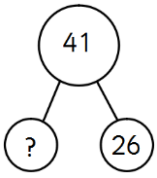
40 – 10 = 30

7 - 3 = 4

47 – 13 = 34

☐ = 47 - 13

Subtracting using the column method (with exchange)

Concrete	Pictorial	Abstract
Using the base 10  Using the place value counters  	Drawing base 10 352 - 86 =  Drawing counters 352 - 86 =  	Missing numbers 352 = 86 + □ 41 = □ + 26 Column subtraction 41 - 26 =  Part whole model 

<u>Y5 (Milestone 3 Basic)</u>

- With support, subtract negative numbers

<u>Y6 (Milestone 3 Secure)</u>

- Use the column method to subtract up to 6 digits including decimals
- With reminders, add and subtract negative numbers.

Multiplication

Key vocabulary:

multiplication **repeated addition** **product** **multiplied by**

groups of **lots of** **times** **multiply**

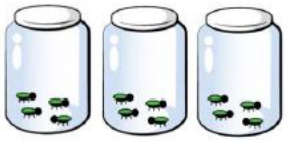
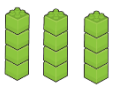
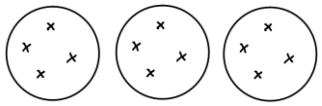
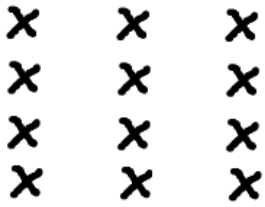
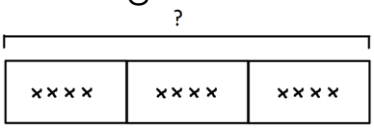
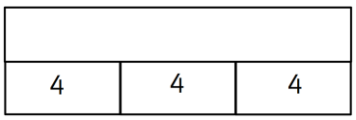
Y1 (Milestone 1 Basic)

- With support, solve one step problems using multiplication with concrete objects, arrays and pictorial representations.
- With support, recognise that 2 numbers can be multiplied in any order.

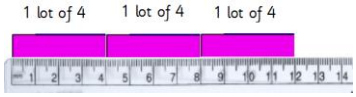
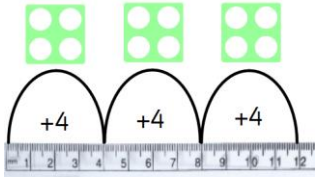
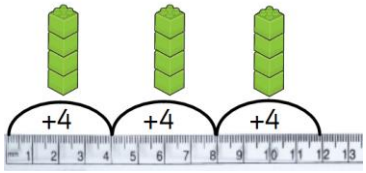
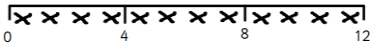
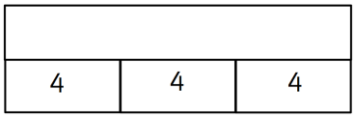
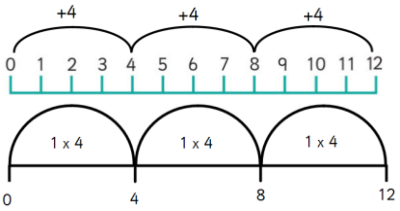
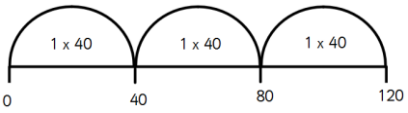
Y2 (Milestone 1 Advancing)

- Solve one step problems using multiplication with concrete objects, arrays and pictorial representations.
- Use knowledge of numbers multiplied in any order to check calculations.
- Solve simple problems using mental multiplication methods.

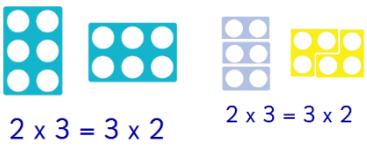
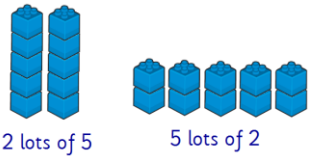
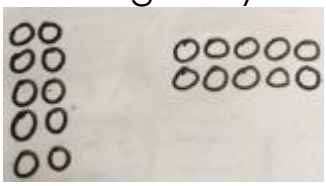
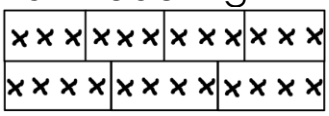
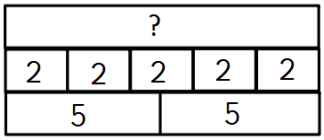
Repeated grouping/repeated addition with objects

Concrete	Pictorial	Abstract
Using objects 3 equal groups with 4 in each group  Using pasta to create shapes 3 lots of 4  Multilink cubes  Numicon 	Drawing objects  or  Drawing bar models 	3 x 4 = 12 3 lots of 4 = 12 4 + 4 + 4 = 12 

Repeated grouping on a number line

Concrete	Pictorial	Abstract
Cuisenaire rods  Numicon  Cubes  	Drawing objects on a number line  	Bar model  Jumps on a number line  Recognising links 

Showing commutativity

Concrete	Pictorial	Abstract
Numicon  Cubes  Pasta  	Drawing arrays  Bar modelling 	10 = 2 x 5 5 x 2 = 10 5 + 5 = 10 10 = 2 + 2 + 2 + 2 + 2 

Y3 (Milestone 2 Basic)

- Multiply a 2 digit number by a 1 digit number using the formal written layout.
- With support, multiply 3 numbers together.
- With support, identify and use factor pairs in mental calculations

Y4 (Milestone 2 Advancing)

- Multiply 2 and 3 digit numbers formally by a 1 digit number using the formal written layout.
- Identify and use factor pairs in mental calculations.
- Multiply 3 numbers together.

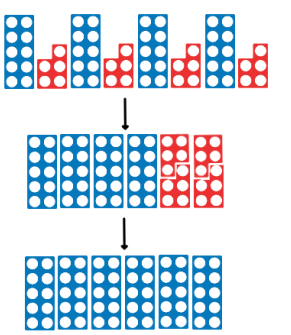
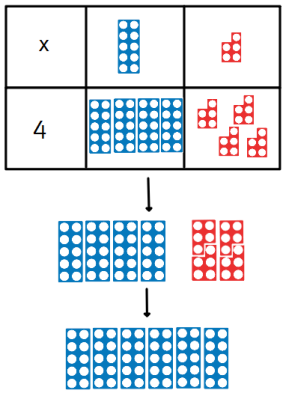
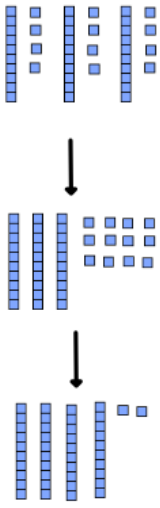
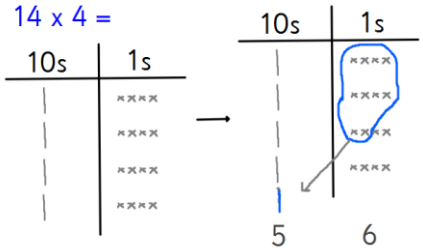
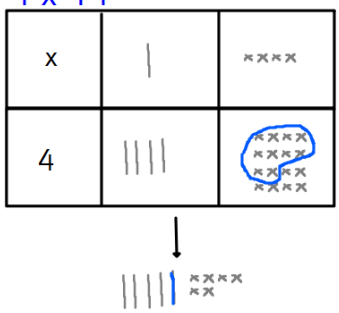
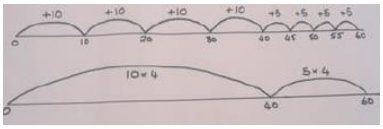
Y5 (Milestone 3 Basic)

- With support, use written formal method for multiplication of 4 digit numbers by 2 digit numbers (long multiplication).
- Mentally solve multistep problems e.g. 5 x 3 – 6 and 60 x 6

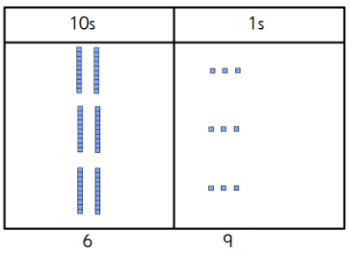
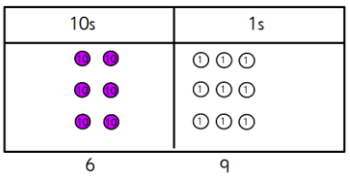
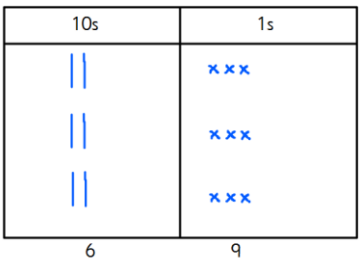
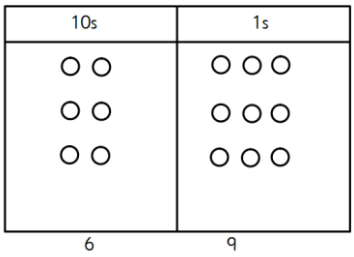
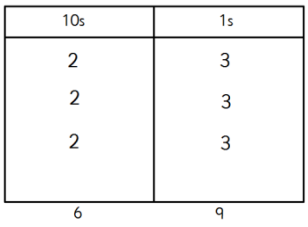
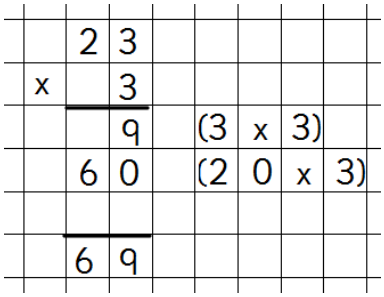
Y6 (Milestone 3 Advancing)

- Problems involving the four operations are undertaken accurately and the BIDMAS rule is understood.
- Use written formal method for multiplication of 4 digit numbers by 2 digit numbers (long multiplication).
- Mentally solve multi-step problems e.g. 0.6 x 6

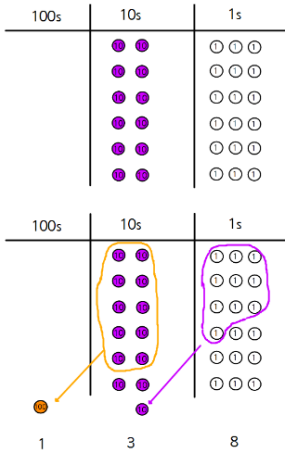
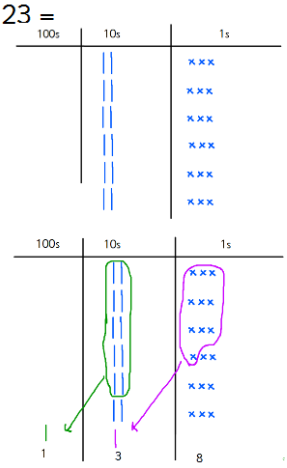
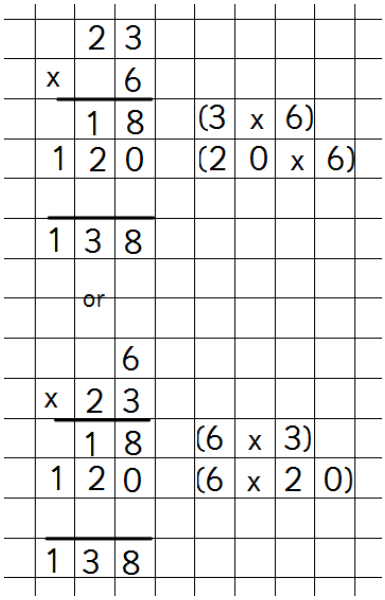
Using partitioning to multiply

Concrete	Pictorial	Abstract
Numicon 4 x 15 =   or Base 10 3 x 14 =  (Grid method can also be used as with the Numicon above)	Drawing base 10 14 x 4 =  4 x 14 = 	4 x 15 = 10 5 4 x 10 = 40 4 x 5 = 20 40 + 20 = 60 Number line  Grid method 4 x 14 = x 10 4 4 40 16 40 + 16 = 56

Formal column method (no regrouping)

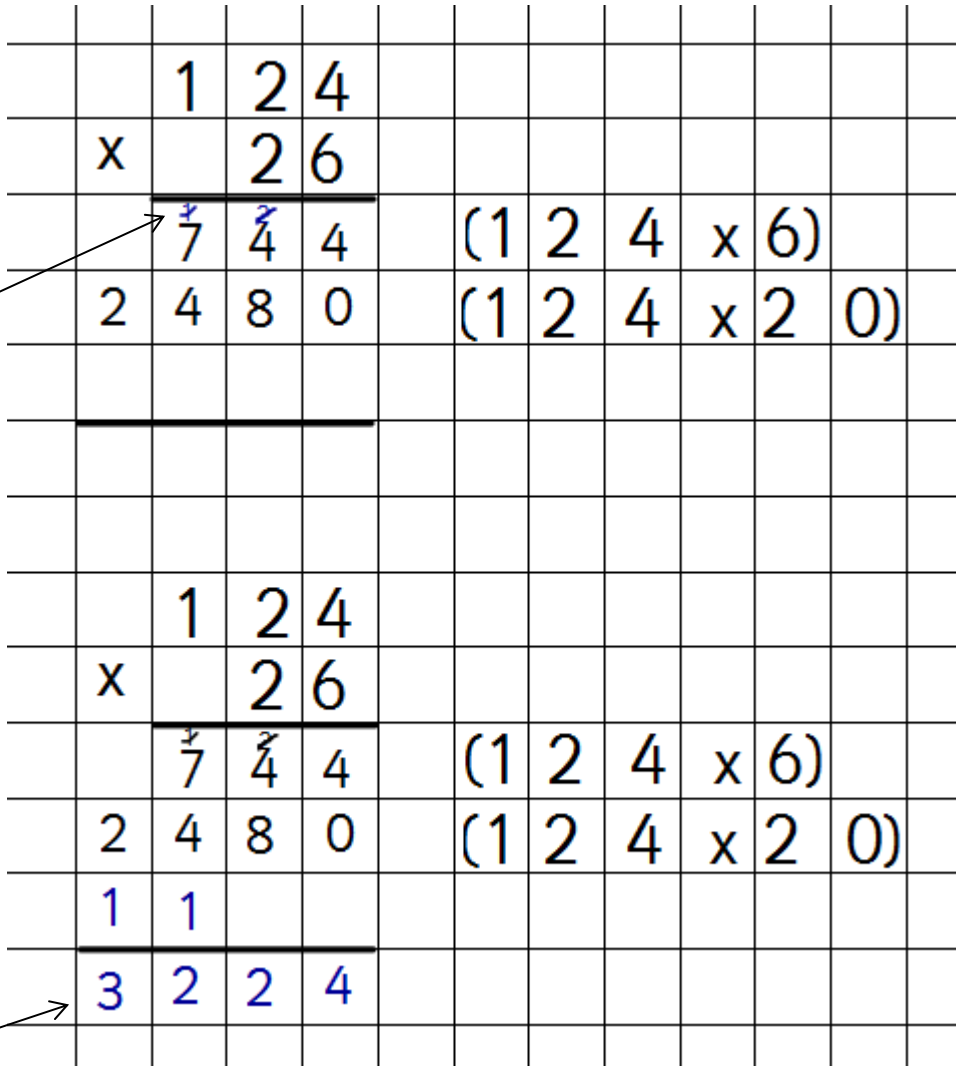
Concrete	Pictorial	Abstract
Base 10 3 x 23 =  Place value counters 3 x 23 =  	Drawing base 10 3 x 23 =  Drawing counters 3 x 23 =  	3 x 23 =  

Formal column method (with regrouping)

Concrete	Pictorial	Abstract
Place value counters 6 x 23 =  (Base 10 could also be used in the same way)	Drawing base 10 6 x 23 =  (Place value counters could also be used in the same way)	

Multiplying a 3 digit number by a 2 digit number and beyond…

(Children should already be confident with the formal method of multiplying with regrouping. Children need to be confident with the abstract method shown below. If children are struggling with this method, recap the previous concrete and abstract methods shown for multiplying a 3-digit and 1-digit number.)

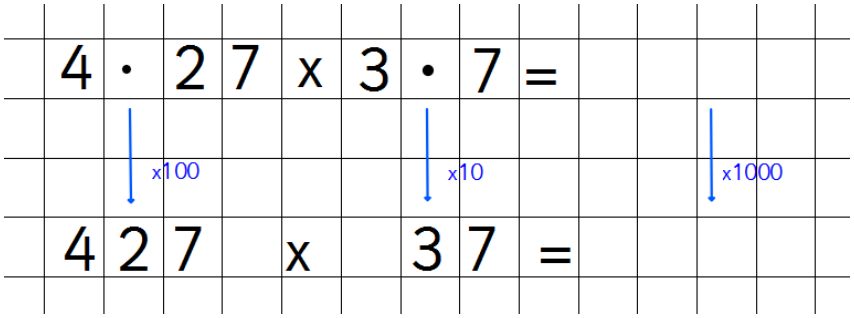


The small digits represent regrouping. They are written above the larger digits. These digits are crossed out after being regrouped. This helps avoid confusion when calculating the final answer.

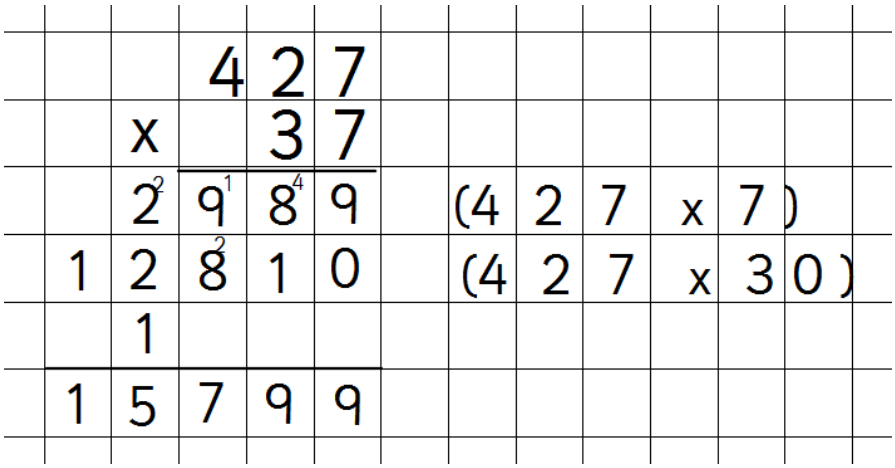
As with the column addition method, children leave a line for regrouping.

Multiplying decimals

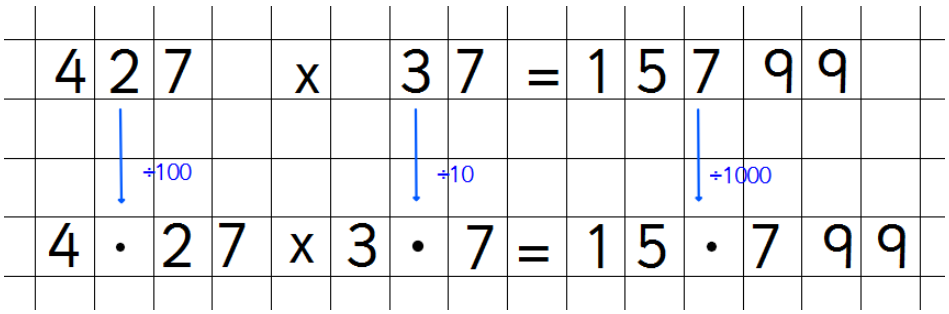
Step 1: Multiply each decimal by multiples of 10 to create whole numbers.



Step 2: Multiply the two whole numbers together using the method on page 20.



Step 3: Divide the whole numbers by the multiples of 10.



Division

Key vocabulary:

division **divide by** **share** **group** **divide**

equal parts **whole** **fractions**

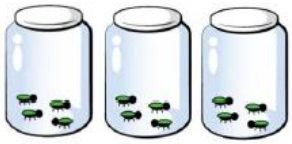
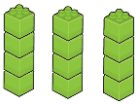
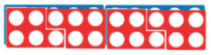
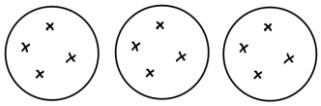
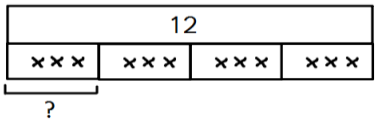
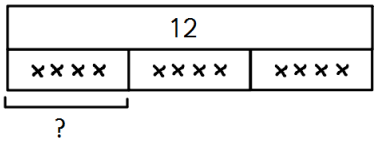
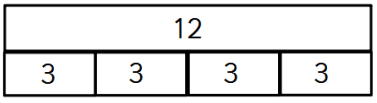
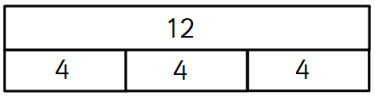
Y1 (Milestone 1 Basic)

- With support, solve one step problems using division with concrete objects, arrays and pictorial representations.
- With support, recognise that numbers cannot be divided in any order.

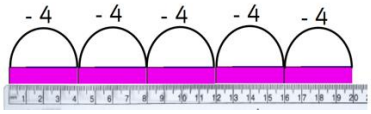
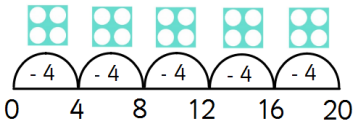
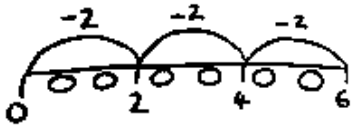
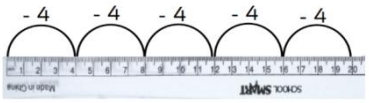
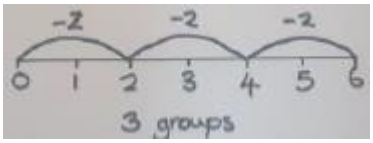
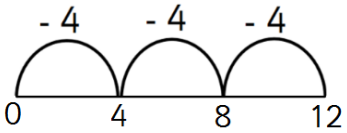
Y2 (Milestone 1 Advancing)

- Solve one step problems using division with concrete objects, arrays and pictorial representations.
- Recognise that numbers cannot be divided in any order

Sharing equally using objects

Concrete	Pictorial	Abstract
Using classroom objects, sharing out one at a time between the groups. 12 shared between 3 is 4.  Multilink cubes  or  Numicon 20 ÷ 5 = 	Drawing objects 12 ÷ 3 =  Drawing bar models 12 ÷ 3 =  12 ÷ 4 =  	12 ÷ 4 = ☐ ☐ = 12 ÷ 3 12 shared by 3 is ☐ ? What is 12 shared by 4?  

Repeated subtraction

Concrete	Pictorial	Abstract
Cuisenaire rods 20 ÷ 4 = 5  Numicon 20 ÷ 4 = 5  	Drawing number lines  	Number lines 20 ÷ 4 =  6 ÷ 2 =  12 ÷ 4 = 

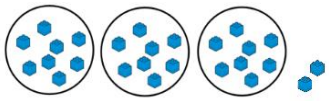
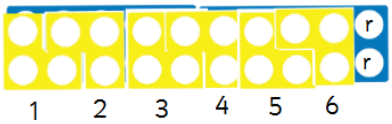
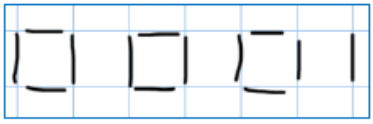
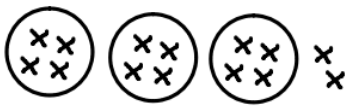
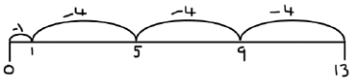
Y3 (Milestone 2 Basic)

- Divide a 2 digit number by a 1 digit number using the formal written layout.

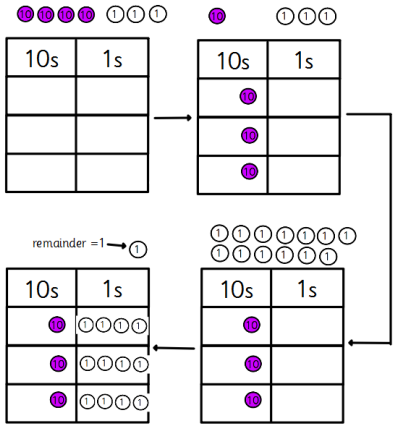
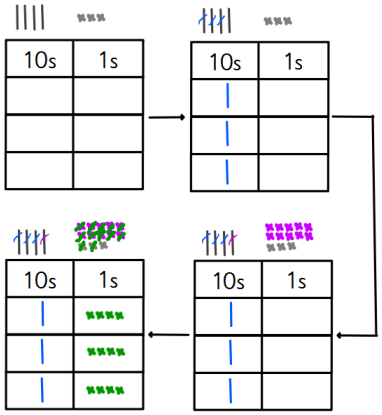
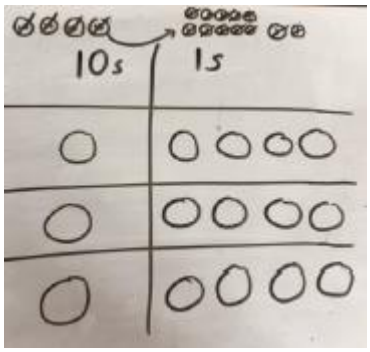
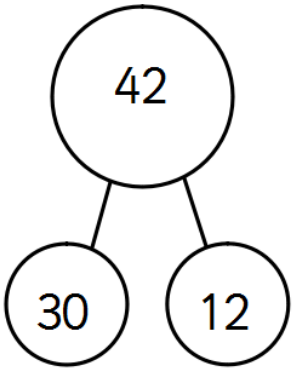
Y4 (Milestone 2 Advancing)

- Divide 2 and 3 digit numbers by a 1 digit number using the formal written layout.

Introducing remainders

Concrete	Pictorial	Abstract
Cuisenaire rods 20 ÷ 6 = 3 r 2  **Using pasta pieces** 20 ÷ 3 = 6 r 2  **Sharing cubes** 26 ÷ 3 = 8 r 2  **Using children** Children get into groups of 4, how many children are leftover? Repeat with other numbers. What is the remainder this time? **Numicon** 20 ÷ 3 = 6 r 2 	**Drawing shapes** There are 3 whole squares with 1 leftover.  ÷3 → triangles ÷4 → squares ÷5 → pentagons etc **Sharing** 14 ÷ 3 = four in each group with two remaining 	**Drawing number lines** 13 ÷ 4 = 3 remainder 1  There are 4 cars altogether and each car holds 5 people. 23 people need to travel by car. Are there enough cars? How many extra car places are needed? Ben shares out 26 raisins between his three children so that they each have an equal amount. How many does he have leftover?

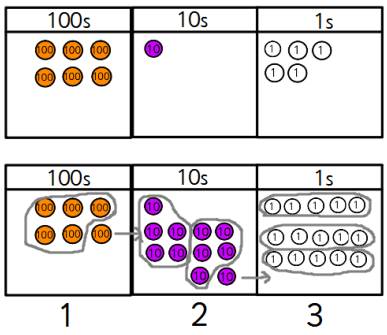
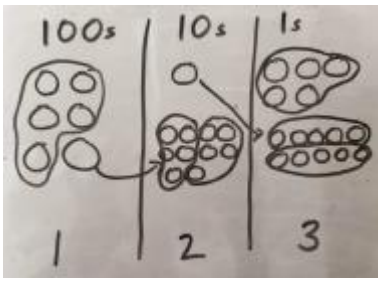
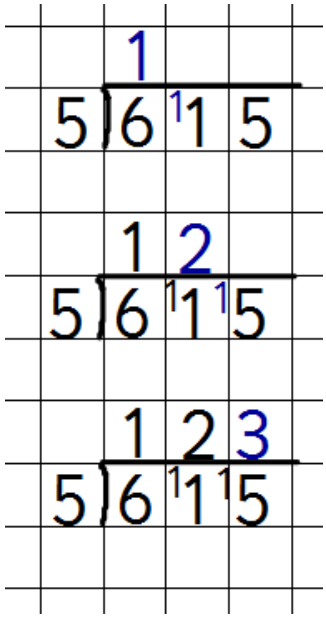
Dividing a 2 digit number by a 1 digit number

Concrete	Pictorial	Abstract
Place value counters 43 ÷ 3 = 14 r 1  The same method can also be shown using base 10.	Drawing base 10 43 ÷ 3 = 14 r 1  Drawing place value counters 42 ÷ 3 = 14  	Children use partitioning to divide. 42 ÷ 3 =  30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14 So 42 ÷ 3 = 14

Y5 (Milestone 3 Basic)

- With support, use formal written method for division of a 4 digit number by a 1 digit numbers.

Dividing a 3 digit number by a 1 digit number (short division)

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

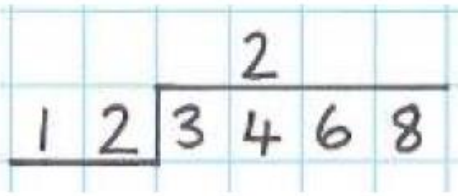
Y6 (Milestone 3 Secure)

- Use formal written method for division of a 4 digit number by a 2 digit numbers.

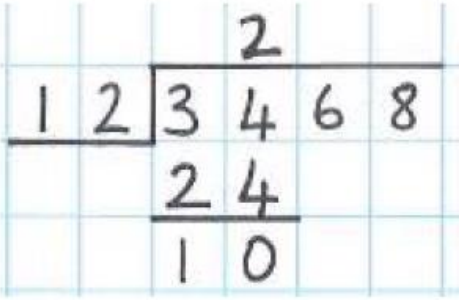
Divide numbers up to four digits by a two-digit whole number using long division.

Step 1: How many 12s are there in 3?

Since 3 is smaller than 12, there are no 12s in 3.

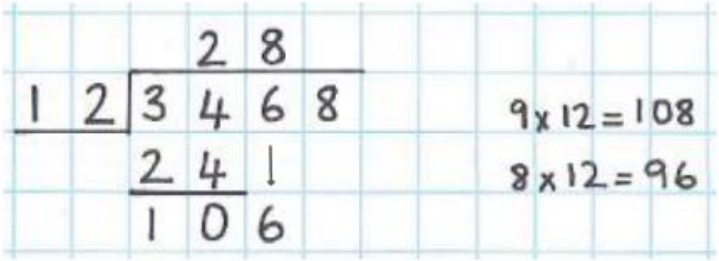


Step 2: So how many 12s are there in 34? We can work out that there are 2 lots of 12 in 34. We write this number above the 4.

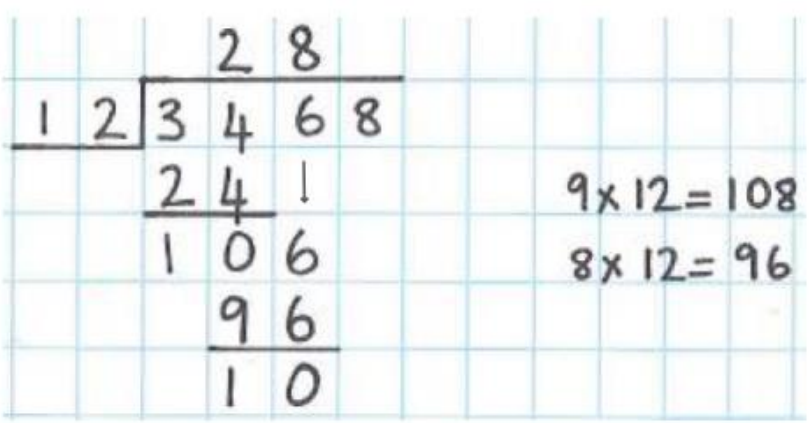


Step 3: We then need to write down the exact amount that 2 x 12 comes to underneath the 34, so that we can see how many are left. 34 - 24 = 10

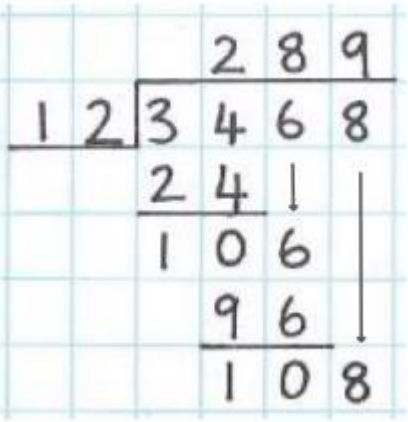
Step 4: Bringing down the next digit, we now need to find out how many 12s there are in 106. Separate jottings on the side may be helpful. The answer of 8 is written above the 6.



Step 5: Having established that there are 8 lots of 12 in 106, we need to work out how many we have left over. 8 x 12 = 96, leaving a remainder of 10.

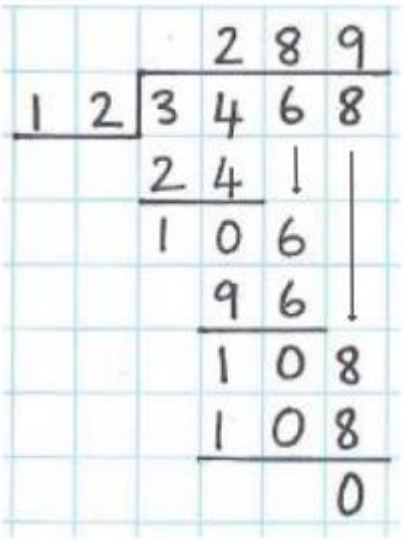


Step 6 Again, we bring down the next digit in the question (8). Now we have to calculate how many 12s there are in 108. The answer of 9 is written above the 8.



Step 7 12 x 9 = 108 which leaves us with no remainders.

So, 3468 ÷ 12 = 289



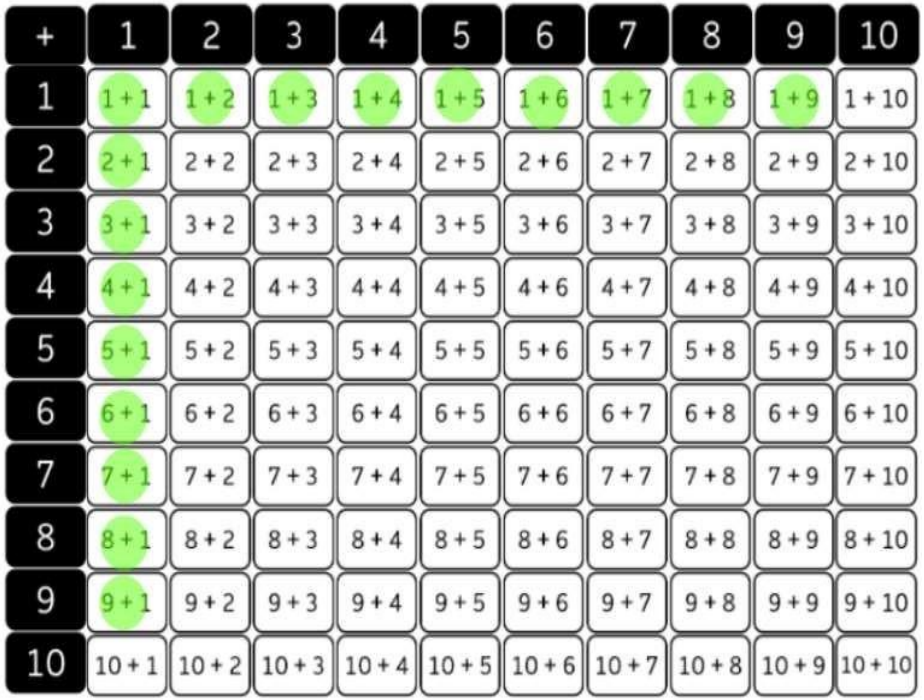
Maths non-negotiables (Key instant recall facts)

	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Autumn 1	Say the number names in order to 5	Adding and subtracting 1 within 10 e.g. 5 + 1 = 6	Know all addition facts within 20 e.g. 7 + 8 = 15	Know multiplication and division facts for the 4 times table	Know multiplication and division facts for the 9 times table	Know all decimals that total 1 or 10 (1 decimal place)	Know all decimals that total 1 (2 decimal places)
Autumn 2	Say the number names in order to 10	Adding and subtracting 2 within 10 e.g. 5 – 2 = 3	Know all subtraction facts within 20 e.g. 15 – 7 = 8	Know multiplication and division facts for the 8 times table	Know multiplication and division facts for the 12 times table	Know metric conversion facts e.g. 1kg = 1000g	Use all multiplication and division facts to derive x and ÷ of small multiples of 10 and 100 (e.g. 30 x 900; 8100 ÷ 9)
Spring 1	Begin to recognise the days of the week	Know all addition and subtraction number bonds to 10	Know multiplication and division facts for the 10 times table	Consolidate 2s, 5s, 10s, 3s, 4s and 8s times tables	Know multiplication and division facts for the 7 times table	Know the doubles and halves of all two-digit numbers	Use multiplication and division facts to multiply and divide decimals (e.g. 1.2 x 8)
Spring 2	Partition numbers to 5 into two groups	Know doubles and halves within 10 e.g. 4 + 4 = 8 8 – 4 = 4	Know multiplication and division facts for the 2 times table (link to doubles/halves)	Know multiplication and division facts for the 6 times table	Consolidate multiplication and division facts up to 12 x 12	Know pairs of factors of numbers up to 100	Know the decimal and percentage equivalents of the fractions ⅓, ⅔, 1/10s and 1/5s
Summer 1	Count forward and backwards in ones from any number up to 10	Know near doubles within 10 e.g. 3 + 4 = 7 and difference of 1 or 2 subtractions e.g. 7 – 6 = 1	Know multiplication and division facts for the 5 times table	Know multiplication and division facts for the 11 times table	Consolidate multiplication and division facts up to 12 x 12	Know the decimal and percentage equivalents of the fractions ½, ¼, ¾	Know the prime numbers within 50
Summer 2	Count forwards and backwards in ones from any number up to 20	Know all addition and subtraction facts within 10	Know multiplication and division facts for the 3 times table	Consolidate 2s, 5s, 10s, 3s, 4s, 8s, 6s, and 11s times tables	Consolidate multiplication and division facts up to 12 x 12	Know square numbers and square roots to 12 x 12	Know the doubles and halves of all multiples of 100 to 10,000

Y1 NON-NEGOTIABLES OVERVIEW

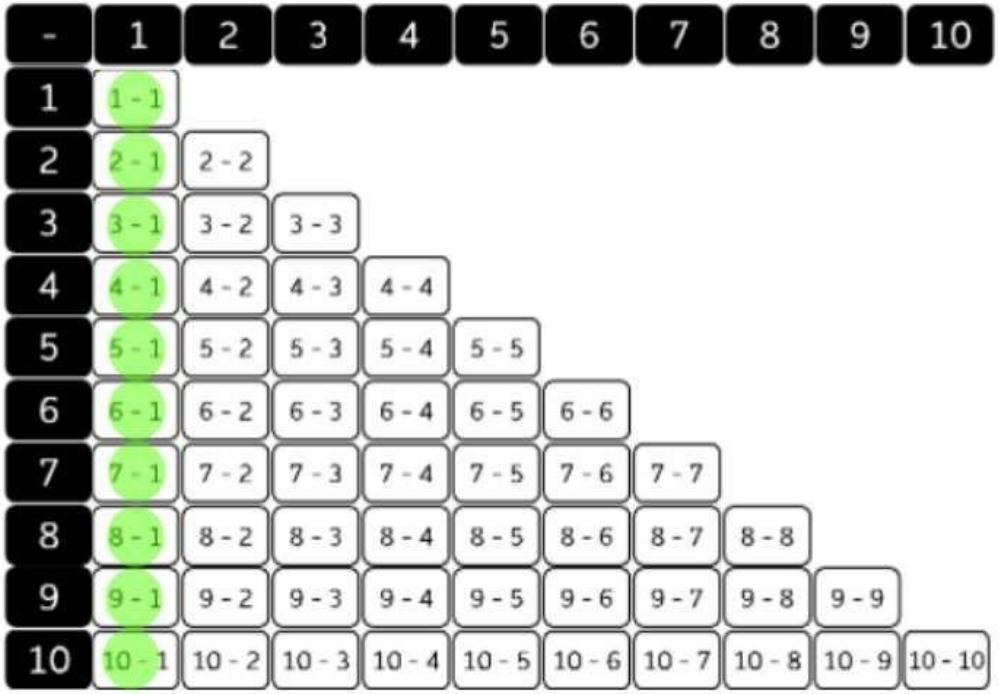
AUTUMN 1

Adding 1 within 10



+	1	2	3	4	5	6	7	8	9	10
1	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

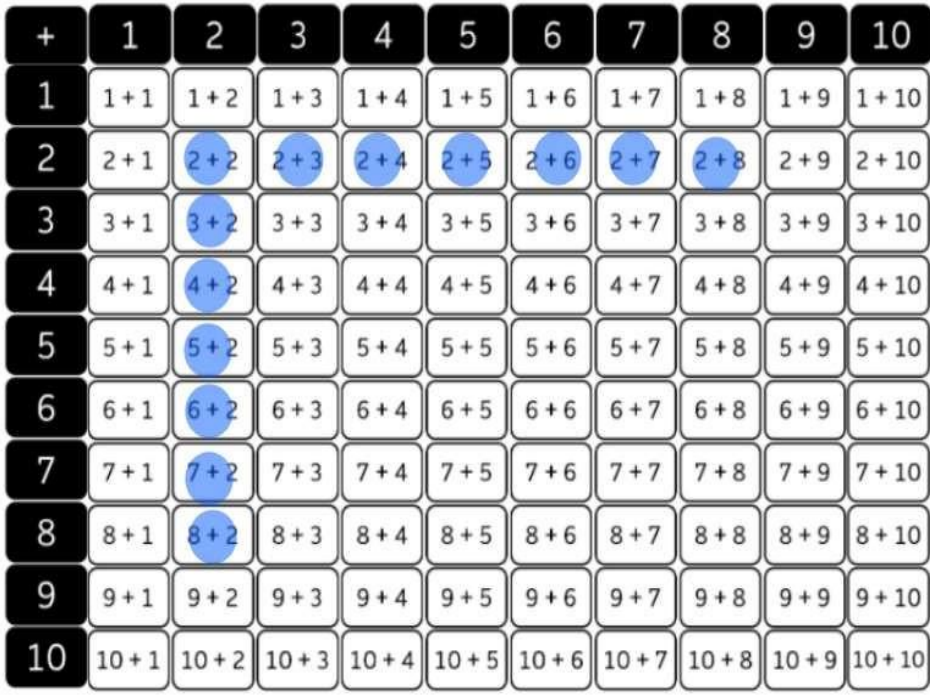
Subtracting 1 within 10



-	1	2	3	4	5	6	7	8	9	10
1	1 - 1									
2	2 - 1	2 - 2								
3	3 - 1	3 - 2	3 - 3							
4	4 - 1	4 - 2	4 - 3	4 - 4						
5	5 - 1	5 - 2	5 - 3	5 - 4	5 - 5					
6	6 - 1	6 - 2	6 - 3	6 - 4	6 - 5	6 - 6				
7	7 - 1	7 - 2	7 - 3	7 - 4	7 - 5	7 - 6	7 - 7			
8	8 - 1	8 - 2	8 - 3	8 - 4	8 - 5	8 - 6	8 - 7	8 - 8		
9	9 - 1	9 - 2	9 - 3	9 - 4	9 - 5	9 - 6	9 - 7	9 - 8	9 - 9	
10	10 - 1	10 - 2	10 - 3	10 - 4	10 - 5	10 - 6	10 - 7	10 - 8	10 - 9	10 - 10

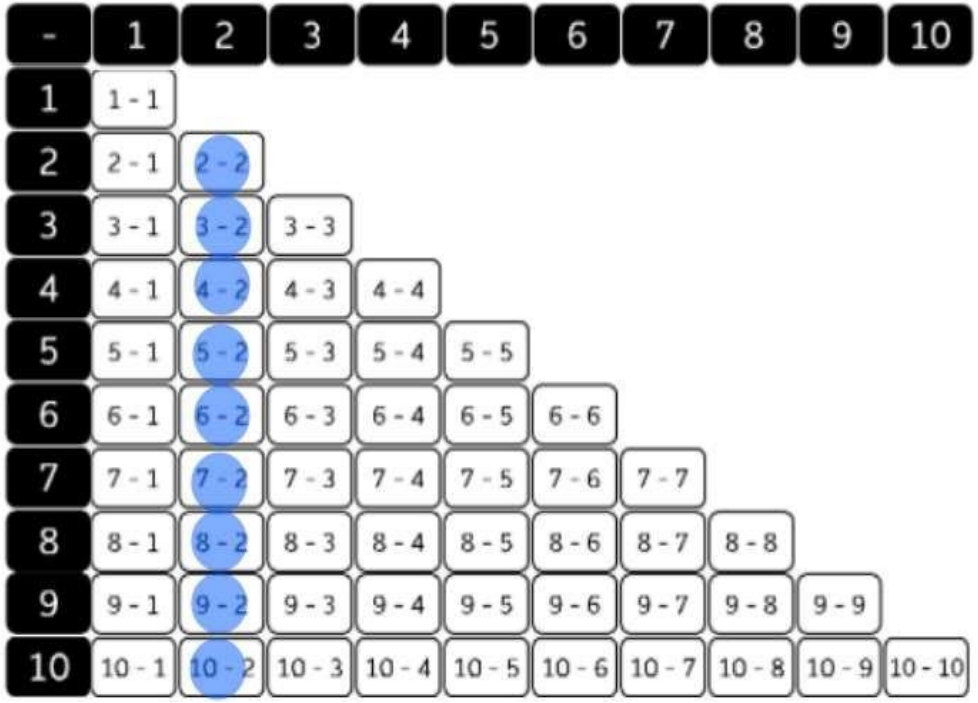
AUTUMN 2

Adding 2 more



+	1	2	3	4	5	6	7	8	9	10
1	1 + 1	1 + 2	1 + 3	1 + 4	1 + 5	1 + 6	1 + 7	1 + 8	1 + 9	1 + 10
2	2 + 1	2 + 2	2 + 3	2 + 4	2 + 5	2 + 6	2 + 7	2 + 8	2 + 9	2 + 10
3	3 + 1	3 + 2	3 + 3	3 + 4	3 + 5	3 + 6	3 + 7	3 + 8	3 + 9	3 + 10
4	4 + 1	4 + 2	4 + 3	4 + 4	4 + 5	4 + 6	4 + 7	4 + 8	4 + 9	4 + 10
5	5 + 1	5 + 2	5 + 3	5 + 4	5 + 5	5 + 6	5 + 7	5 + 8	5 + 9	5 + 10
6	6 + 1	6 + 2	6 + 3	6 + 4	6 + 5	6 + 6	6 + 7	6 + 8	6 + 9	6 + 10
7	7 + 1	7 + 2	7 + 3	7 + 4	7 + 5	7 + 6	7 + 7	7 + 8	7 + 9	7 + 10
8	8 + 1	8 + 2	8 + 3	8 + 4	8 + 5	8 + 6	8 + 7	8 + 8	8 + 9	8 + 10
9	9 + 1	9 + 2	9 + 3	9 + 4	9 + 5	9 + 6	9 + 7	9 + 8	9 + 9	9 + 10
10	10 + 1	10 + 2	10 + 3	10 + 4	10 + 5	10 + 6	10 + 7	10 + 8	10 + 9	10 + 10

Subtracting 2 less



-	1	2	3	4	5	6	7	8	9	10
1	1 - 1									
2	2 - 1	2 - 2								
3	3 - 1	3 - 2	3 - 3							
4	4 - 1	4 - 2	4 - 3	4 - 4						
5	5 - 1	5 - 2	5 - 3	5 - 4	5 - 5					
6	6 - 1	6 - 2	6 - 3	6 - 4	6 - 5	6 - 6				
7	7 - 1	7 - 2	7 - 3	7 - 4	7 - 5	7 - 6	7 - 7			
8	8 - 1	8 - 2	8 - 3	8 - 4	8 - 5	8 - 6	8 - 7	8 - 8		
9	9 - 1	9 - 2	9 - 3	9 - 4	9 - 5	9 - 6	9 - 7	9 - 8	9 - 9	
10	10 - 1	10 - 2	10 - 3	10 - 4	10 - 5	10 - 6	10 - 7	10 - 8	10 - 9	10 - 10

SPRING 1

Addition number bonds to 10

+	1	2	3	4	5	6	7	8	9	10
1	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

Subtraction number bonds to 10

-	1	2	3	4	5	6	7	8	9	10
1	1-1									
2	2-1	2-2								
3	3-1	3-2	3-3							
4	4-1	4-2	4-3	4-4						
5	5-1	5-2	5-3	5-4	5-5					
6	6-1	6-2	6-3	6-4	6-5	6-6				
7	7-1	7-2	7-3	7-4	7-5	7-6	7-7			
8	8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8		
9	9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	
10	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10

SPRING 2

Doubles within 10

+	1	2	3	4	5	6	7	8	9	10
1	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

Halving within 10

-	1	2	3	4	5	6	7	8	9	10
1	1-1									
2	2-1	2-2								
3	3-1	3-2	3-3							
4	4-1	4-2	4-3	4-4						
5	5-1	5-2	5-3	5-4	5-5					
6	6-1	6-2	6-3	6-4	6-5	6-6				
7	7-1	7-2	7-3	7-4	7-5	7-6	7-7			
8	8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8		
9	9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	
10	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10

SUMMER 1

Near doubles within 10 (4 weeks)

+	1	2	3	4	5	6	7	8	9	10
1	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

Finding the difference (1 or 2)

-	1	2	3	4	5	6	7	8	9	10
1	1-1									
2	2-1	2-2								
3	3-1	3-2	3-3							
4	4-1	4-2	4-3	4-4						
5	5-1	5-2	5-3	5-4	5-5					
6	6-1	6-2	6-3	6-4	6-5	6-6				
7	7-1	7-2	7-3	7-4	7-5	7-6	7-7			
8	8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8		
9	9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	
10	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10

SUMMER 2

Adding 3

+	1	2	3	4	5	6	7	8	9	10
1	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

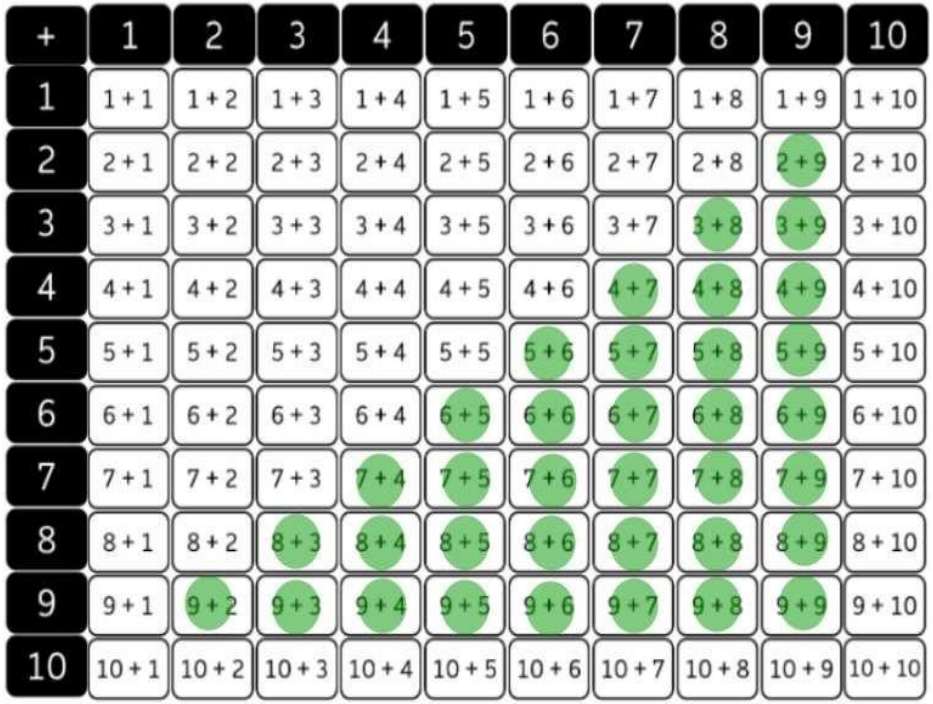
Subtracting 3, 4, 5 and 6

-	1	2	3	4	5	6	7	8	9	10
1	1 - 1									
2	2 - 1	2 - 2								
3	3 - 1	3 - 2	3 - 3							
4	4 - 1	4 - 2	4 - 3	4 - 4						
5	5 - 1	5 - 2	5 - 3	5 - 4	5 - 5					
6	6 - 1	6 - 2	6 - 3	6 - 4	6 - 5	6 - 6				
7	7 - 1	7 - 2	7 - 3	7 - 4	7 - 5	7 - 6	7 - 7			
8	8 - 1	8 - 2	8 - 3	8 - 4	8 - 5	8 - 6	8 - 7	8 - 8		
9	9 - 1	9 - 2	9 - 3	9 - 4	9 - 5	9 - 6	9 - 7	9 - 8	9 - 9	
10	10 - 1	10 - 2	10 - 3	10 - 4	10 - 5	10 - 6	10 - 7	10 - 8	10 - 9	10 - 10

Y2 NON-NEGOTIABLES OVERVIEW

AUTUMN 1

Addition facts within 20



AUTUMN 2

Subtraction facts within 20