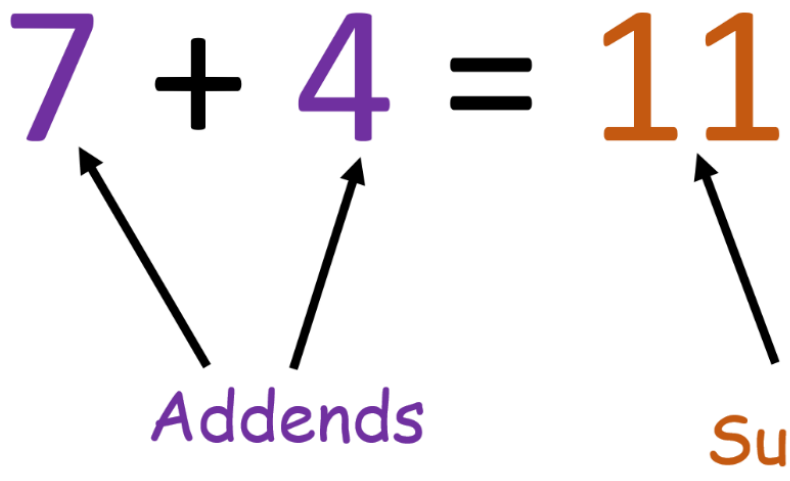
Grayshott Church of England Primary School Calculation Policy

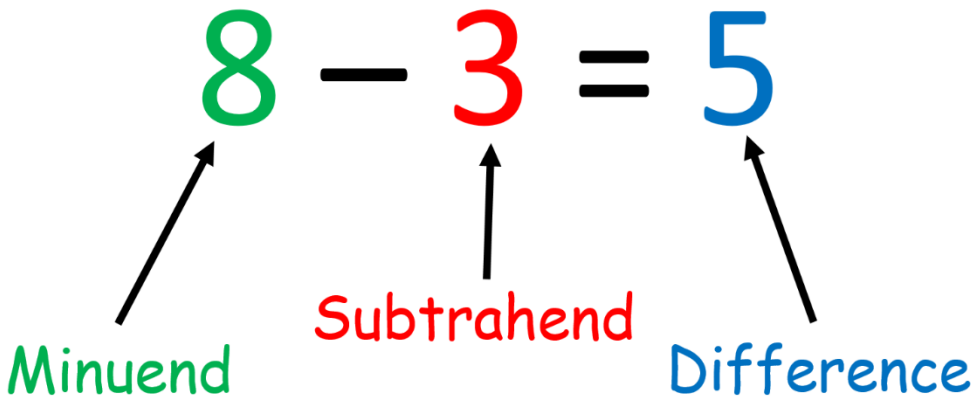
Addition and Subtraction

This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further material added from Hampshire calculation guidance. It is a working document and will be revised and amended as necessary. Many variations have been included to provide teachers with a range of tools to support pupils in their grasp of number and calculation. To ensure consistency for pupils, it is important that that the mathematical language used in maths lessons reflects the vocabulary used throughout this policy.

Addition Vocabulary



Subtraction Vocabulary



Calculation Guidance

This guidance for calculation uses the 'concrete, pictorial, abstract' approach.

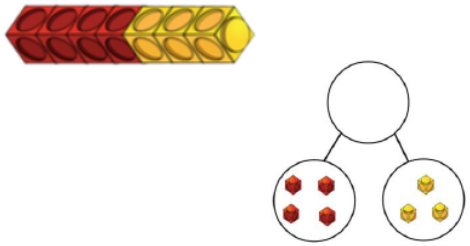
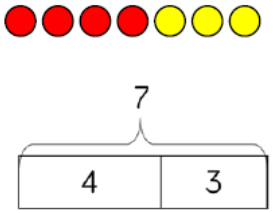
Concrete	Pictorial	Abstract
Using physical objects to solve maths problems	**Using drawings to solve maths problems. This involves drawing representations of the physical objects that have been used in the previous stage as other models and diagrams.**	**Solving maths numbers using only numbers and symbols.**

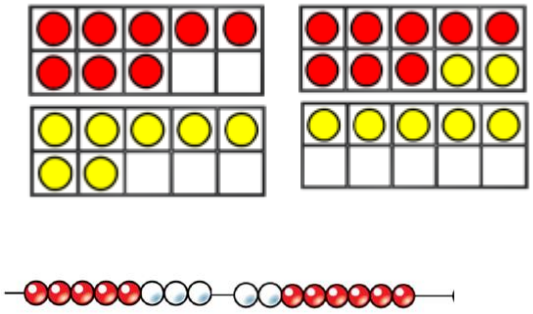
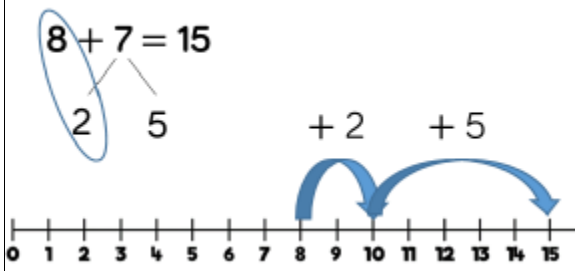
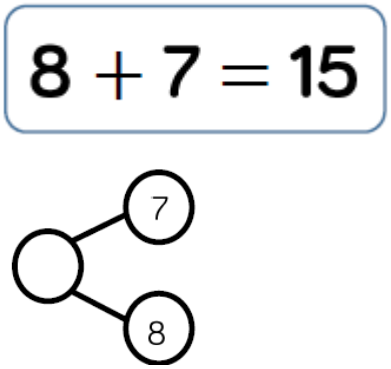
Addition

Year 1

National Curriculum Objectives:

- read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ☐ – 9

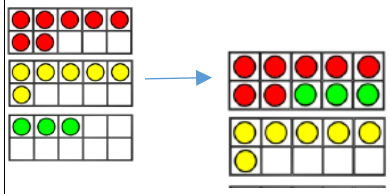
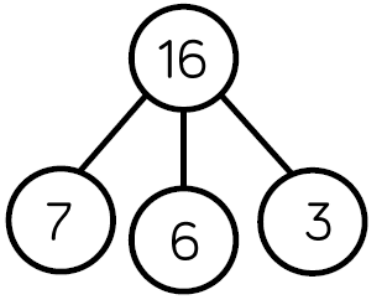
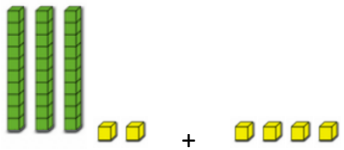
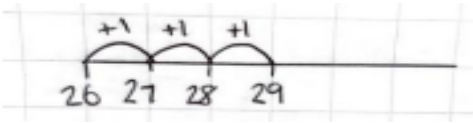
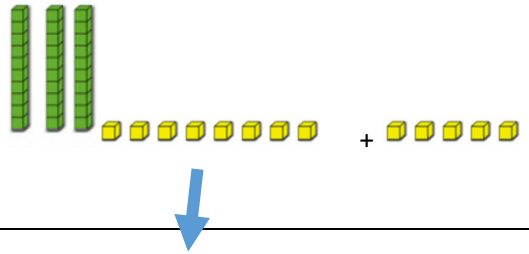
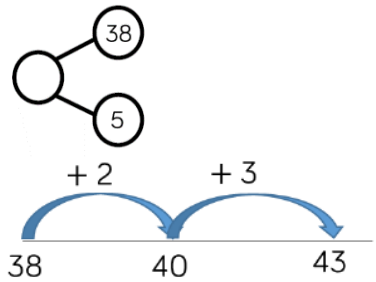
Addition (Year 1) Objective/Skill:	Concrete	Pictorial	Abstract
Add one digit numbers within 10.	Children will use part whole model. Use cubes to add two numbers together as a group or in a bar. 	Use pictures to add two numbers together as a group or in a bar. These numbers be represented or written in a part-whole model. 	$4 + 3 = 7$ Use the part whole diagram as shown above to move into the abstract. Include missing number questions to support varied fluency: 7 = ? + 3 4 + ? = 7

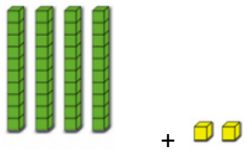
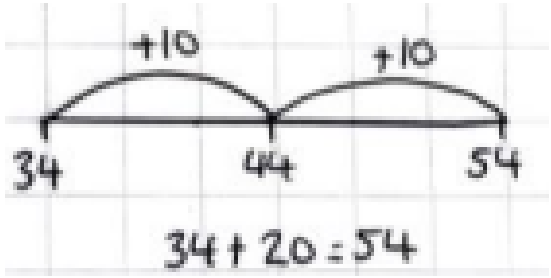
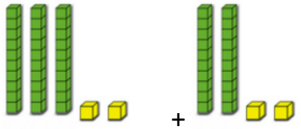
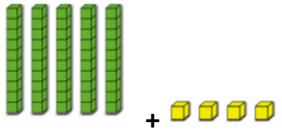
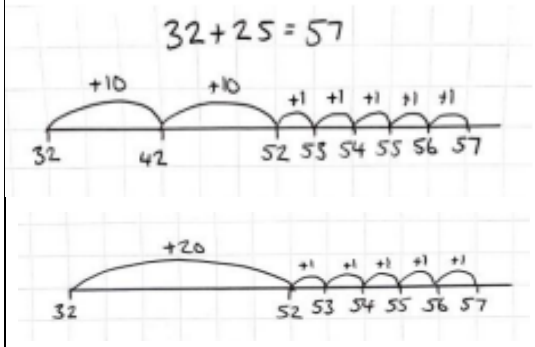
Add one digit and two digit numbers to 20.	Use tens frames or numberbeads to highlight that ten ones is equal to one ten. 	Number lines to be used alongside concrete resources to support children in understanding how to partition their jumps, using their number bonds to 10. 	Use part-whole model to represent calculation. 

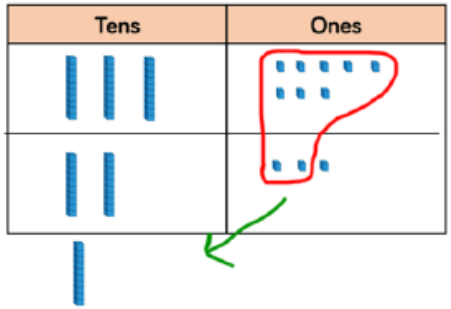
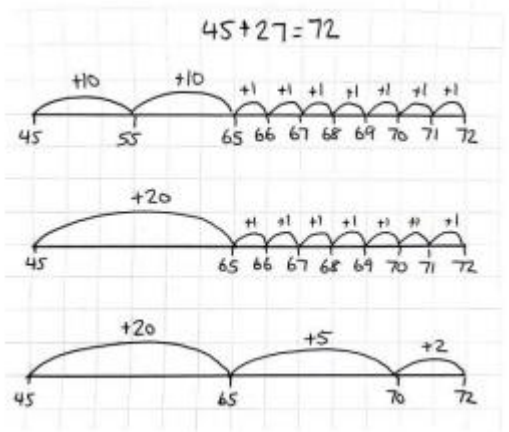
Year 2

National Curriculum Objectives:

- solve problems with addition and subtraction:
  - using concrete objects and pictorial representations, including those involving numbers, quantities and measures
  - applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract 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
  - adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Addition (Year 2) Skill/Objectives	Concrete	Pictorial	Abstract
Add three 1-digit numbers.	Children will be taught to recognise their number bonds to 10 to enable them to add three 1 digit numbers. 		$7 + 6 + 3 = 16$ 10
Add a two digit number and ones (NOT bridging the 10s barrier)	Use Base 10 to identify tens and ones. 	Children will begin to add the ones to a 2 digit number using a structured number line. 	Children will use their knowledge of number facts within 10 to help them complete the calculation mentally. E.g. 25 + 4 A child will use 4 + 5 = 9 to help them calculate that 25 + 4 = 29.
Add a two digit number and ones (bridging the 10s barrier)	Use Base 10 to help children identify groups of 10, then use knowledge of number bonds to 10. It should also be reinforced to children that ten ones is equal to one ten. 38 + 5 	Use part-whole model and number line to identify number bonds to 10 before counting on. Children should be encouraged to count on from the larger number. 	$38 + 5 = 43$ Explore related facts that can be derived: 43 – 5 = 38 43 – 38 = 5

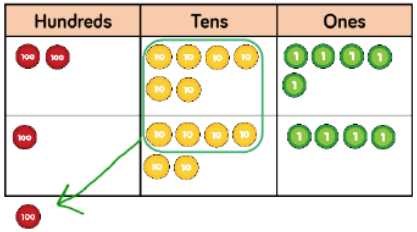
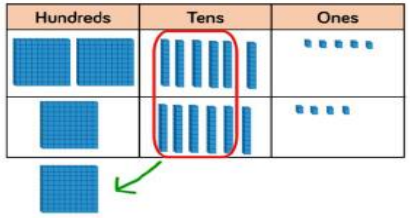
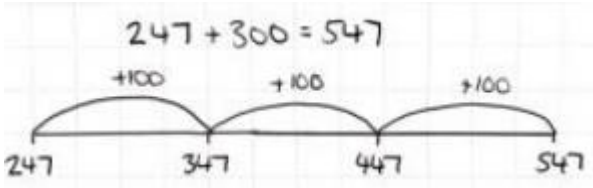
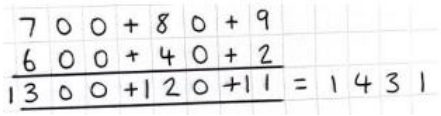
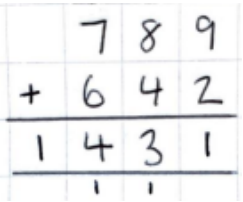
			
Add a 2 digit number and tens.	 Children to explore that the ones digit does not change when counting in 10s.	Children progress to using a number line to count on in 10s. 	Children are then able to use their knowledge of patterns when adding 10 or multiples of 10 to help them complete questions mentally such as this: 27 + 10 = 37 27 + 20 = 47 27 + ? = 57
Add two 2-digit numbers within 100 (without bridging).	Children will continue to use Base 10 to add two digit numbers, partitioning into tens and ones.  	Children will progress to a number line, counting on in 10s or multiples of 10 from the largest number, before counting on in ones. 	Children will partition numbers into tens and ones and complete the calculation mentally. They will use their knowledge of addition facts within 10 to support them. 32 + 25 = 57 30 + 20 = 50 2 + 5 = 7 50 + 7 = 57

Add 2 digit numbers within 100 (with bridging)	Children use Base 10 to help them identify that ten ones are equal to a ten. This introduces them to the concept of exchanging. 	Children will use number lines to make jumps in 10s or multiples of 10. 	Children will partition numbers into tens and ones and complete the calculation mentally. They will use their knowledge of addition facts within 20 to support them. 45 + 27 = 72 40 + 20 = 60 5 + 7 = 12 60 + 12 = 72

Year 3

National Curriculum Objectives

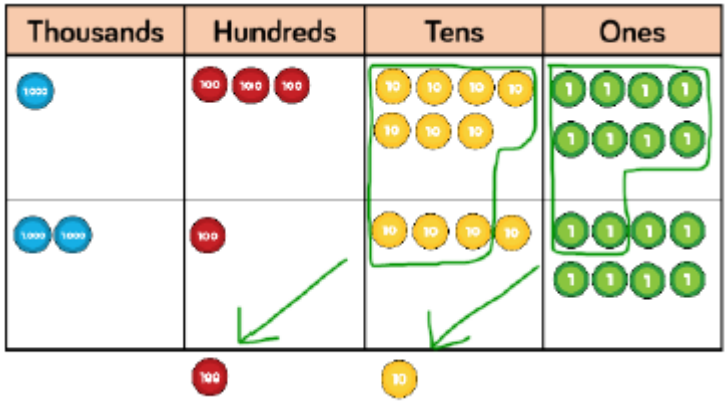
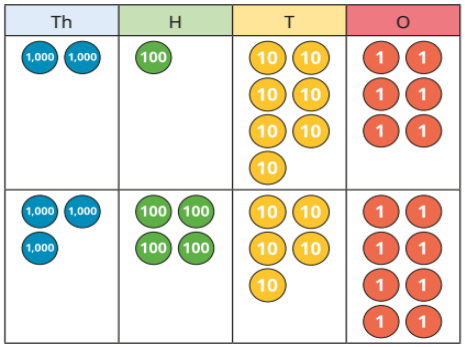
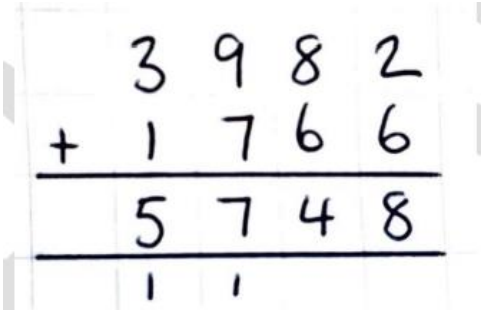
- add and subtract numbers mentally, including:
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Addition (Year 3) Objectives	Concrete	Pictorial	Abstract
Add numbers with up to 3 digits (crossing hundreds barrier)	Children will be introduced to using and drawing place value counters as well as Base 10 to explore exchanging ten 10s for a hundred.   	Children will progress to count on in ones, multiples of 10 and 100 on a number line.  	Children will begin with the expanded column method.  They will then progress to the compact column method. 

Year 4

National Curriculum Objectives:

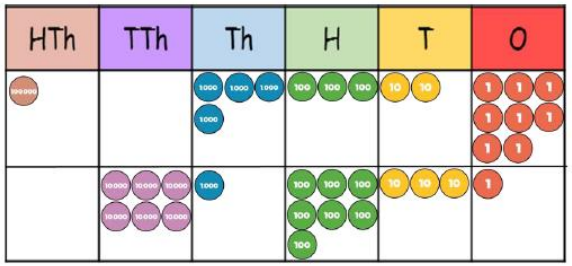
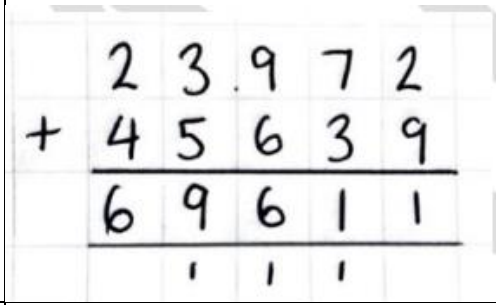
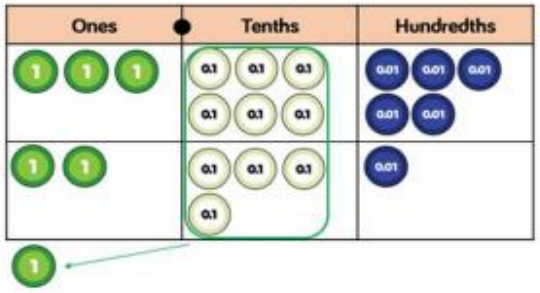
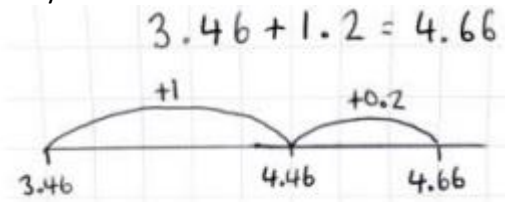
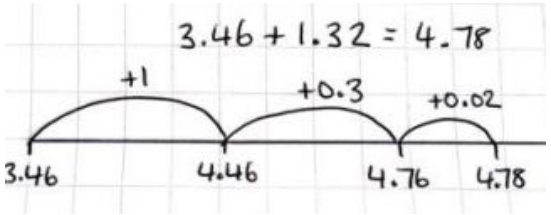
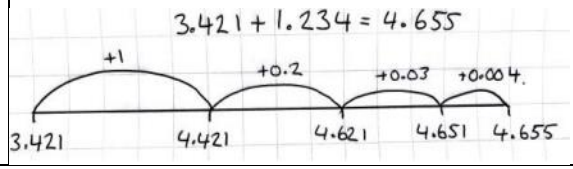
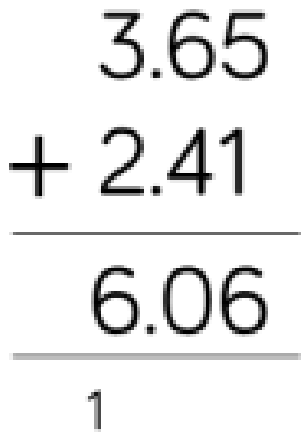
- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Addition (Year 4) Objectives	Concrete	Pictorial	Abstract
Add numbers with up to 4 digits.	Children will revisit using place value counters to help them with exchanging when crossing the tens and hundreds barrier. 	Children may draw representations of place value counters to help reinforce the concept of exchanging when crossing the tens and hundreds barrier. 	Children will use column addition. Children would be encourage to check that the numbers in the calculation would not be suited to a more efficient strategy. 

Year 5

National Curriculum Objectives:

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Addition (Year 5) Objectives	Concrete	Pictorial	Abstract
Add numbers with more than 4 digits (up to 6 digits).	Children may revisit using place value counters and make representations of these in their book. 	Children may draw representations of place value counters in their books.	Children will continue to progress with their understanding of the column addition. 
Add numbers with up to 3 decimal places.	Children will progressively learn the value of tenths, hundredths and thousandths. They will understand that: 10 tenths = 1 (A whole) 10 hundredths = 1 tenth 100 hundredths = 1 (A whole) The children will explore these calculations using place value counters. 	They will progresss to adding numbers with 1 d.p, 2 d.p and ultimately 3 d.p by the end of the year.   	Children will us their knowledge of place value to use the column addition method accurately. 

Year 6

National Curriculum Objectives

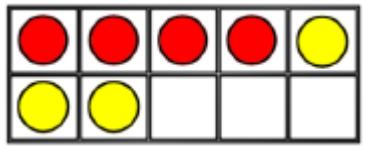
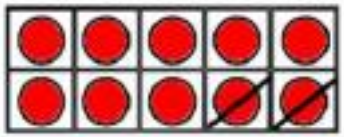
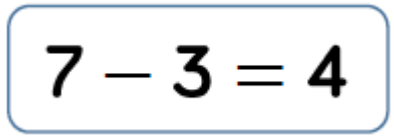
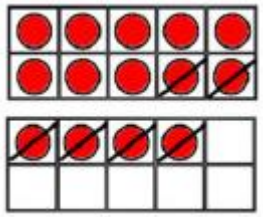
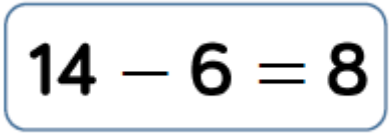
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division

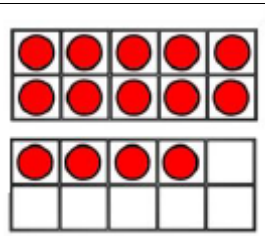
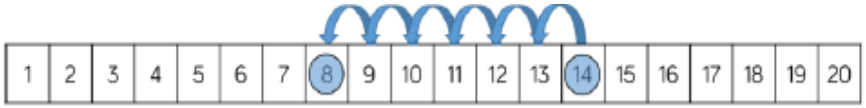
Addition (Year 6) Objectives	Concrete	Pictorial	Abstract
Solve addition and subtraction multi-step problems.	**As Year 5**	**As Year 5**	**As Year 5**

Subtraction

Year 1
National Curriculum Objectives:

- read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ☐ – 9

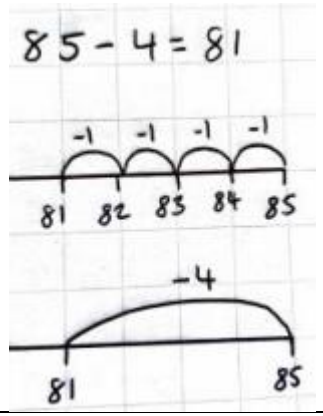
Subtraction (Year 1) Objectives	Concrete	Pictorial	Abstract
Subtract numbers within 10.	Children will use tens frames to help them to begin to understand the concept of take away by removing counters. 	Children will be presented with a picture of a tens frame and will cross out the counters to help them take away a number. 	Children will be able to use their knowledge of number facts to 10 to help them complete a calculation mentally. 
Subtract 1 digit and 2 digit numbers within 20.	Children will use two tens frames to explore taking a single digit number away from a 2 digit number by physically removing the counters.	Children will use tens frames to help them identify their numbers to 20 before crossing out a number to complete a calculation. 	Children will use their knowledge of number facts to help them complete a calculation mentally. 

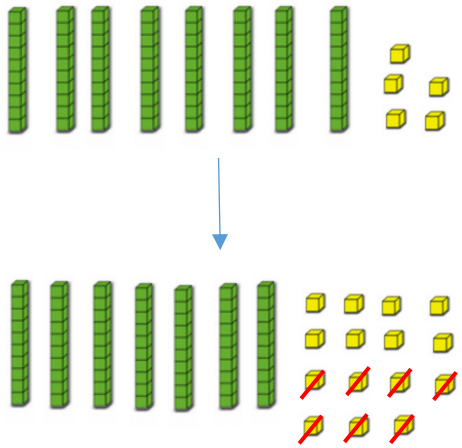
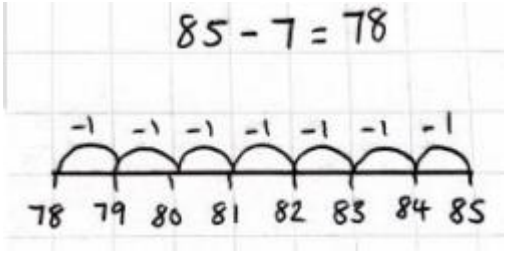
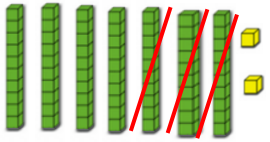
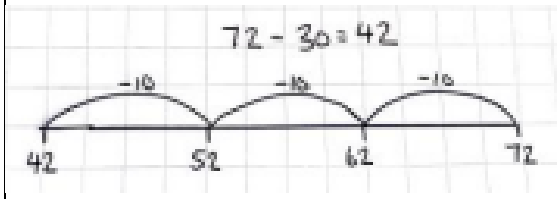
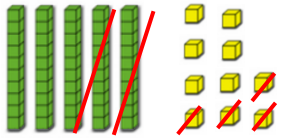
		Children will also use number tracks or structured number lines to help them count back. 	

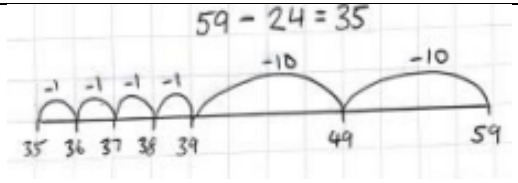
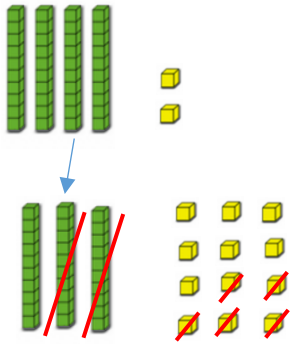
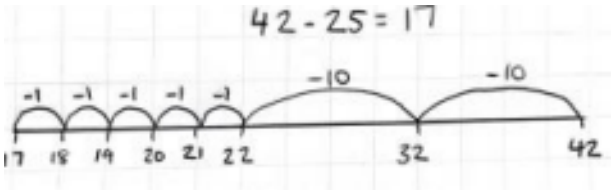
Year 2

National Curriculum Objectives:

- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract 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
  - adding three one-digit numbers

Subtraction (Year 2) **Objectives**	**Concrete**	**Pictorial**	**Abstract**
Subtract 2 digit numbers and ones (without bridging 10s barrier.	 Children will learn to subtract ones from a 2 digit number using Base 10. They will learn to also represent this pictorially in their books.	Children will progress to using structured number lines and counting back from the 2 digit number in ones. 	Children will be able to complete a subtraction calculation mentally by drawing upon their number facts to 10. 68 – 5 = 63 Children will use 8 – 5 = 3 to help them complete this calculation.

Subtract 2 digit numbers and ones (with bridging the 10s barrier)	Children will need to revisit their understanding of ten ones being equal to one ten. Children will begin to learn to exchange one ten for ten ones in order to complete the calculation. 	Children will use a structured number line to count back in ones. 	Children will use their knowledge of number facts and the number system to help them complete a calculation mentally. **85 – 7 = 78** Children will mentally countback in ones or will recognise that they can count back 5 and then 2.
Subtract 2 digit numbers and tens.	Children will begin to subtract 10s using concrete apparatus, identifying what changes (the number of tens) and what stays the same (the ones). **72 - 30** 	Children will progress to using a structured number line to count back in 10s or multiples of 10. 	Children will be able to draw upon their knowledge of number facts and their knowledge of patterns to subtract a ten or multiple of 10 mentally. 72 – 30 = 42 Children will use the number fact 7 – 3 = 4 to help them.
Subtract 2 digit numbers (without bridging).	 59 – 24	Children will progress to a structured number line, counting back in tens and then in ones.	Children will be able to draw upon their knowledge of number facts and their knowledge of patterns to subtract a ten or multiple of 10 mentally. 59 – 24 = 35

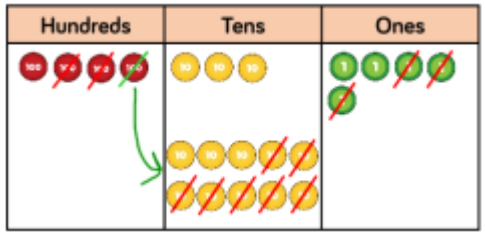
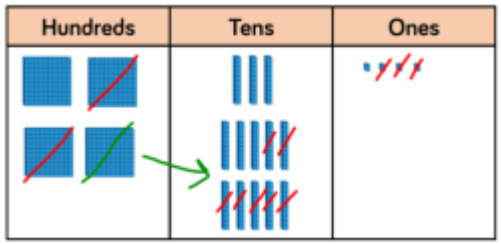
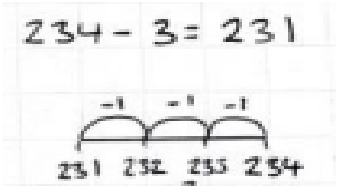
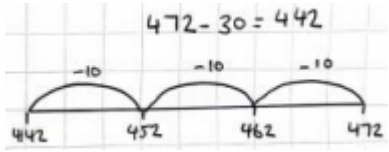
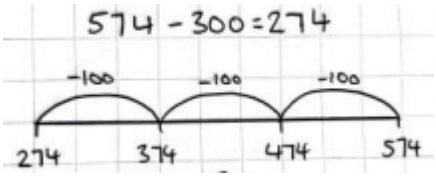
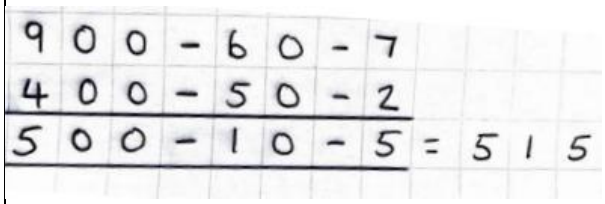
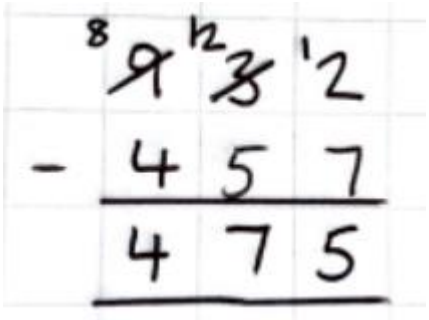
	Children will use Base 10 to represent the calculation and may then draw these representations in their maths book.		Children will use the number facts of 50 – 20 and 9 – 4 to help them.
Subtract 2 digit numbers (with bridging).	Children will apply their knowledg of exchanging to exchange one ten for ten ones before completing the calcualtion. 42 – 25 	Children will progress to a structured number line, counting back in tens and then in ones, crossing the tens barrier. 	Children will be able to draw upon their knowledge of number facts and their knowledge of patterns to subtract a ten or multiple of 10 mentally. 42 – 25 = 17 Children will use their knowledge of subtracting 10s to do this first: 42 – 20 = 22 They will then count back 5 from 22 to reach the answer of 17.

Year 3

National Curriculum Objectives

- add and subtract numbers mentally, including:
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Subtraction (Year 3) **Objectives**	**Concrete**	**Pictorial**	**Abstract**

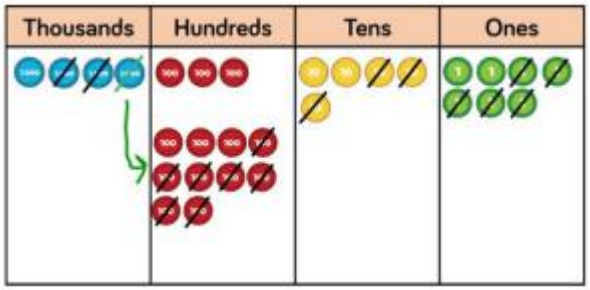
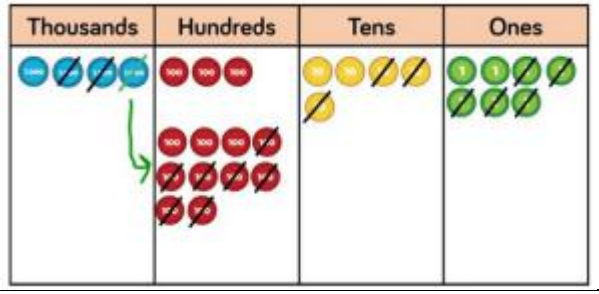
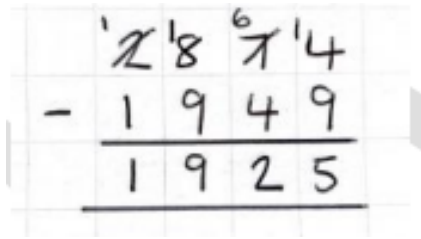
Subtract numbers with up to 3 digits.	Children will be using and drawing place value counters as well as Base 10 to explore exchanging ten 10s for a hundred.   	Children will progress to counting backwards in ones, multiples of 10 and 100s on a number line.    	Children will progress to expanded column subtraction (without exchanging):  They will then progress to the compact method of column subtraction which will involve exchanging: 

Year 4

National Curriculum Objectives:

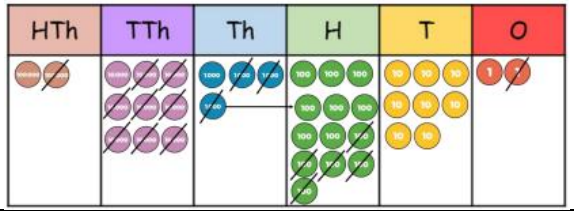
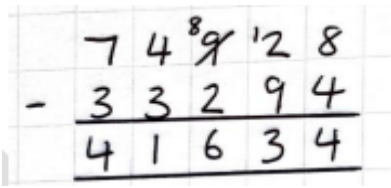
- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Subtraction (Year 4) **Objectives**	**Concrete**	**Pictorial**	**Abstract**

Subtract numbers with up to 4 digits.	Children will explore doing this with place value counters, focusing on learning to exchange 10 hundreds for thousand. 	Children may draw representations of place value counters to help reinforce the concept of exchanging particularly when crossing the thousands barrier. 	Children will build on their introduction to column subtraction in year 3 and apply the same method. 

National Curriculum Objectives:

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Subtraction (Year 5) **Objectives**	**Concrete**	**Pictorial**	**Abstract**
Subtract numbers with more than 4 digits.	Children may revisit using place value counters and make representations of these in their book. 		Children will apply their knowledge of column subtraction to complete the calculation. 

Year 6

National Curriculum Objectives

- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division

Subtraction (Year 6) **Objectives**	**Concrete**	**Pictorial**	**Abstract**
Solve addition and subtraction multi-step problems.	As Year 5	As Year 5	Children will apply their knowledge of column subtraction to complete the calculation.