Calculation Policy - Addition and Subtraction

September 2024

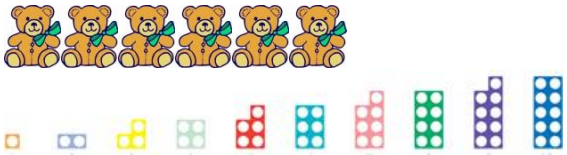
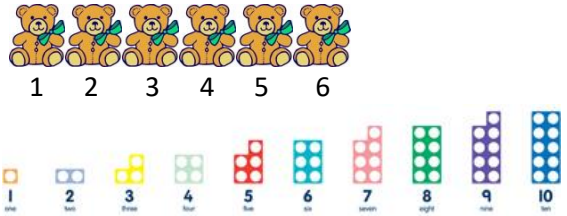
Review date: September 2027

EYFS:

The principal focus of mathematics teaching and calculation in the early years involves providing children with opportunities to develop and improve their skills in counting, understanding and using numbers and calculating simple addition and subtraction problems.

Three characteristics of effective teaching and learning are:

- **playing and exploring** - children investigate, experience things and 'have a go'.
- **active learning** - children concentrate and keep on trying if they encounter difficulties and enjoy their achievements.
- **creating and thinking critically** - children have and develop their own ideas, make links between ideas and develop strategies for doing things.

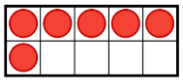
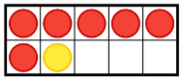
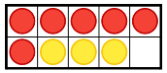
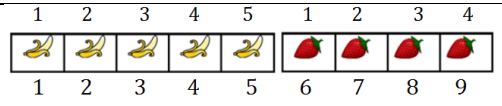
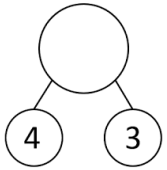
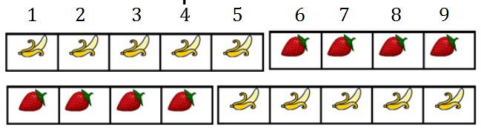
EYFS	Concrete	Pictorial	Abstract
Write numbers from 1 to 10	Counting familiar objects and resources. 	Linking objects to number formation and cardinality.  1 2 3 4 5 6	Counting and writing a number within a set. How many teddies are there?  4
Know doubles to 5	Using familiar objects, images and resources.  		Begin to recall and write double facts to 5 What is double 3?
Begin to record simple number sentences using symbols: + - and =	Refer to processes shown in Year 1 for children who are ready for this.		
Find one more and one less.			

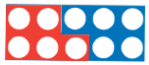
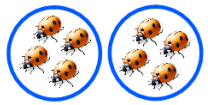
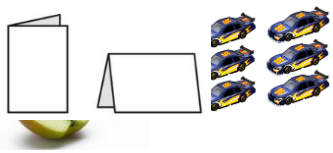
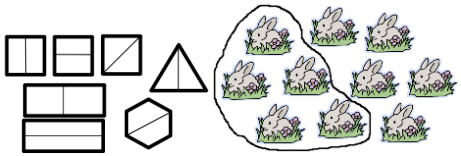
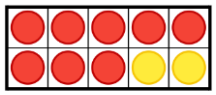
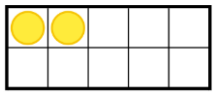
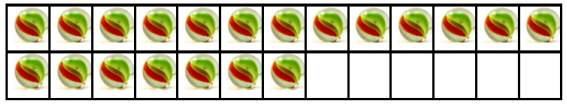
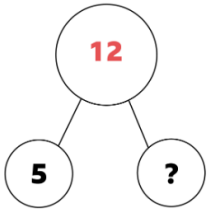
Key Stage 1:

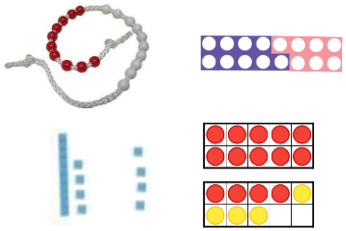
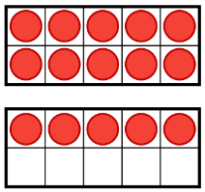
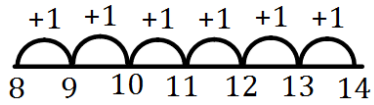
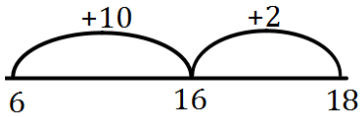
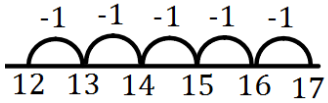
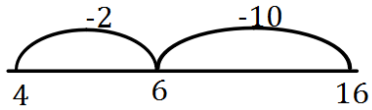
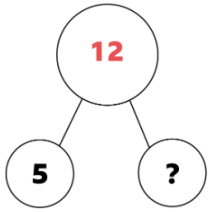
- The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including practical resources (for example, concrete objects and measuring tools).

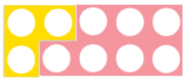
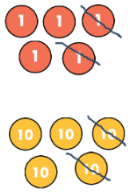
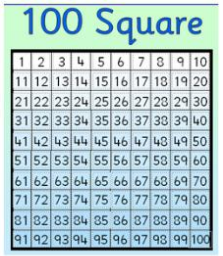
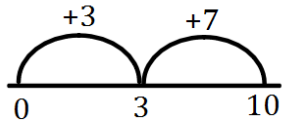
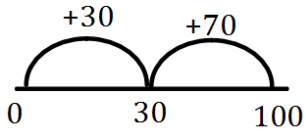
- By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

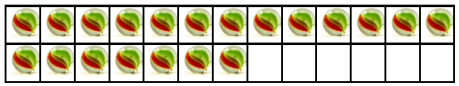
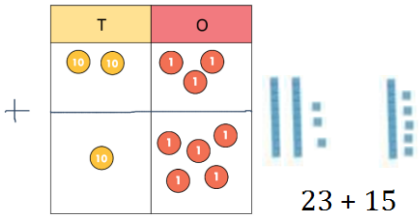
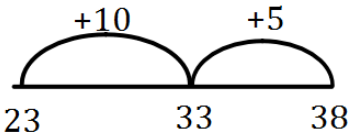
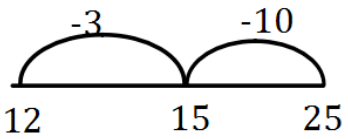
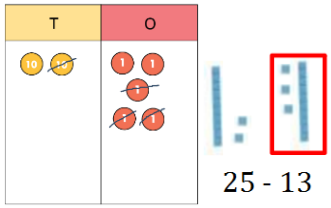
End of year expectations	Rapid recall	Mental calculation	Language	Using and applying
Year 1	Bonds to 10 1 more or less than a number	Bonds to 20 U + Multiple of 10	Put together Add Altogether Total Take away Difference between More than and less than Equal	Solve simple one-step problems that involve addition and subtraction, using concrete objects and pictorial representations and missing number problems. E.g. 3 +? = 14 7 =? - 11
Year 2	Bonds to 20 Related ± bonds to 100 with multiples of 10 e.g. 10 – 3 = 7 so 100 – 30 = 70	TU ± U TU ± Multiple of 10 Adding three one-digit numbers Bonds to 100 with multiples of 10 and 5	Sum Difference Inverse Calculate Partition	Solve one-step and simple two-step problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures.

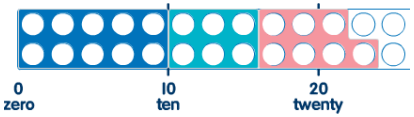
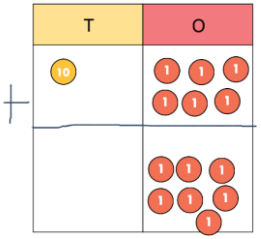
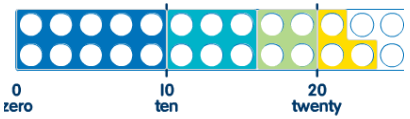
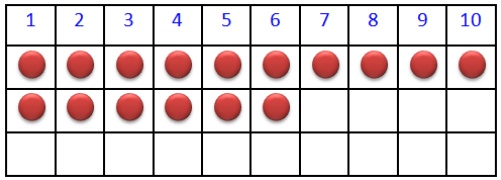
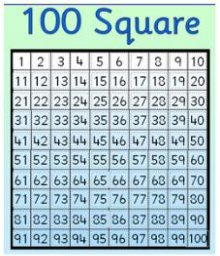
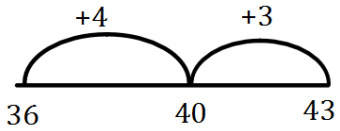
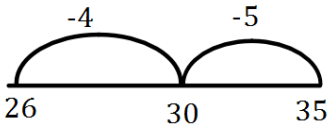
Year 1	Concrete	Pictorial	Arithmetic	Abstract
Find one or more less.	Counting on and back using familiar objects and resources.    	 Labelled number lines  	Introduction to + - and = symbols to create number sentences. 5 – 1 = 4 4 + 1 = 5 Missing number problems. 4 = □ - 1 5 = □ + 1 □ – 1 = 5 □ + 1 = 8	5 people were on a bus. 1 **more** person got on. How many people are there **altogether**? I have £6. My brother has £1 **less** than me. How much money does he have? Use the numbers 3 to 8. How many pairs can you find which have **difference** of 1?
Use addition as combining groups (aggregation).	Counting using familiar objects and resources.    1, 2, 3, 4, 5, 6, 7 	  	Using number sentences and beginning to calculate mentally. 7 + 2 = 9 2 + 7 = 9 9 = 2 + 7 9 = 7 + 2 Missing number problems. 8 = 3 + □ 9 = □ + 2 9 = □ + 5 4 = 9 - □ □ = 9 - 4	I bought 5 sweets. My friend gave me 4 more. How many do I have in **total**? How many different additions can you find with a total of 9?
Addition as counting on (augmentation).	Counting using familiar objects and resources.  	Bar model comparisons.  Labelled number lines  		

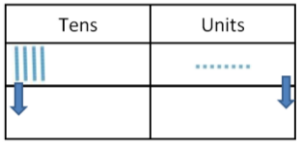
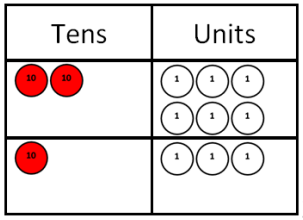
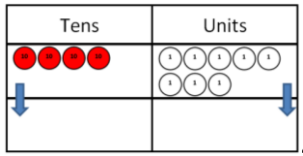
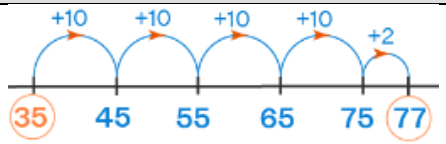
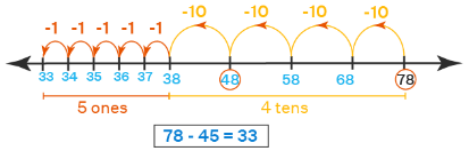
Year 1	Concrete	Pictorial	Arithmetic	Abstract
Doubling and halving numbers within 20 (as repeated addition and subtraction).	Using familiar objects and resources.    	Using a variety of models and images.  	Using number sentences and beginning to calculate mentally. 6 + 6 = Double 9 = 14 = Double … Half of 18 = … 10 = half of…. 7 = 14 - □ 4 + □ = 8	I had 10 pennies. I gave my friend half of my money. How much do we each have? Class 1 has 8 girls. Class 2 has **double** the number of girls. How many girls are there in Class 2? How many **doubles** can you find which include the number 4? E.g., Double 4 = 8 Double 2 = 4 Double 7 = 14 etc.
Addition and subtraction facts within 20.	Using familiar objects and resources.    	 13 – 6 = Labelled number lines  	Using number sentences and calculating mentally. 13 + 4 = 17 17 = 13 + 4 4 + 13 = 17 17 = 4 + 13 17 – 4 = 13 13 = 17 - 4 17 – 13 = 4 4 = 17 - 13 Missing number problems. 15 = □ + 6 18 - □ = 4	My sister is 17. My brother is 9. What is the **difference between** their ages? Class 1 collected £7 for charity. Class 2 collected £8. If they **put** their money **together**, how much would they have? The answer is 11. How many different ways can you use addition or subtraction to solve this?

Year 2	Concrete	Pictorial	Arithmetic	Abstract
Recall and use addition and subtraction facts to 20 ***fluently*** aiming to select the most efficient method.	Using familiar objects and resources. Addition facts  14 + 4 = Subtraction facts  15 – 3 =  15 – 7 =	 Jumping in 1s: 8 + 6 =  Jumping in 10s and units: 6 + 12 =  17 – 5 =  16 – 12 =  	Using number sentences and calculating mentally. 13 + 4 = 17 17 = 13 + 4 4 + 13 = 17 17 = 4 + 13 17 – 4 = 13 13 = 17 - 4 17 – 13 = 4 4 = 17 - 13 Missing number problems. 15 = □ + 6 18 - □ = 4	My foot is 19cm long. My friend's foot is 14cm long. **Calculate** the **difference** between the lengths. How many additions/ subtractions can you make with an even/odd answer? Which patterns can you see in the numbers you have used?

Year 2	Concrete	Pictorial	Arithmetic	Abstract
Derive and use related facts up to 100	Using familiar objects and resources.     3 + 7 = 10  30 + 70 = 100  5 – 2 = 3 50 – 20 = 30	Using 100 squares and number lines.    	Using number sentences and calculating mentally. 20 + 80 = 100 100 - 80 = 20 80 + 20 = 100 100 - 20 = 80 100 = 20 + 80 80 = 100 - 20 100 = 80 + 20 20 = 100 – 80 Missing number problems. 40 = 100 - □ 100 - □ = 70 50 + □ = 100	I am thinking of a number. If I add 80, the **sum** is 100. What is my number? How many different ways can you make £1 using 10p, 20p and 50p coins?

Year 2	Concrete	Pictorial	Arithmetic	Abstract
TU ± U (without crossing 10s boundary) E.g. 16 ± 3 =	Using familiar objects and resources. 	. 	Number sentences and calculating mentally.	There are 29 children in Class 3. 13 children have packed lunch and the rest have school dinner. How many children have school dinners?
TU ± T E.g. 38 ± 20 =	 23 + 15	Number lines:  	23 = 38 – 15 15 = 38 – 23 38 - 15 = 23 38 - 23 = 15 Missing numbers problems. 26 = □ – 10 □ – 10 = 32 □ + 10 = 51 29 = □ + 10	Use the digits 2, 3, 4, and 5. Make two 2 digit numbers. How many different **totals** are there? Can you make the same total in more than one way?
TU ± TU (without units crossing 10s boundary) E.g. 35 ± 13 =	 25 - 13  24 - 13 (Difference images)	Counting up to solve subtraction. Begin on 13 and count up to 25 to solve 25 – 13 = (Begin on 13 and jump 10 to 23 then jump 2 more to 25)		

Year 2	Concrete	Pictorial	Arithmetic	Abstract
TU ± U Bridging to 10 E.g. 17 + 8 or 35 – 9	Using familiar objects and  resources.  16 + 7 as 16 + 4 + 3   Or 23 – 7 as 23 – 3 - 4	Bar model images, 100 squares, number lines.  16 + 7 by counting to next 10 E.g., 16 **+ 4** = 20 20 **+ 3** = 23 16 – 8 by counting back to ten. 16 **– 6** = 10 10 **– 2** = 8   36 + 7 =  35 – 9 =	Using number sentences and solving mentally. 36 + 7 = 43 36 = 43 - 7 7 + 36 = 43 7 = 43 – 36 43 - 7 = 36 43 = 7 + 36 43 - 36 = 7 43 = 36 + 7 Missing number problems. □ + 7 = 43 43 - □ = 36 □ – 36 = 7	(Refer to examples in previous section).

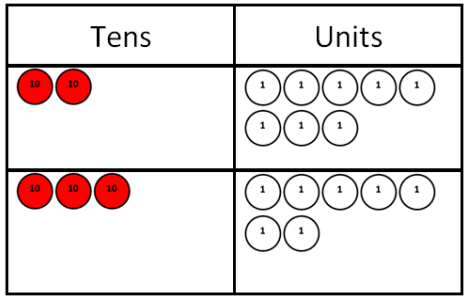
Year 2	Concrete	Pictorial	Arithmetic	Abstract
TU ± TU Expanded methods without crossing 10s or 100s	 26 + 13  48 – 15 (Move 15 down to show what's left)  26 + 13  48 – 15 (Move 15 down to show what's left)	 35 + 42 = 77  78 - 45 = 33 Expanded written methods. 20 + 6 + 10 + 3 30 + 9 = 39 40 + 8 - 20 + 5 20 + 3 = 23	TU ± TU solved mentally. **NB:** Column methods should ***not*** be used at this stage as children should aim to solve TU ± TU mentally.	Use the digits 2, 3, 4, and 5. Make two 2 digit numbers and find the total. What's the highest/lowest **total** you can make? Can you make the same total in more than one way? What is the closest total to 70 you make?
TU ± TU crossing 10s	Extend the concepts above to cross 10s boundaries, understanding the exchange between tens and ones e.g. 35 + 48 = 72 – 26 =			

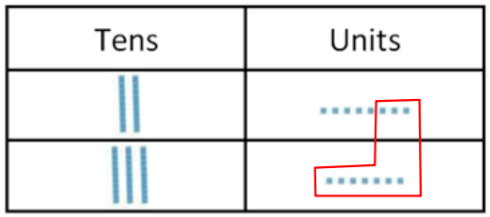
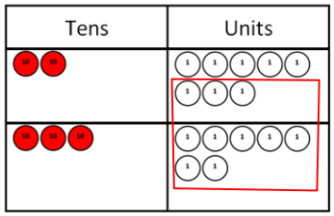
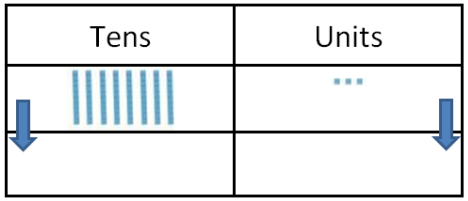
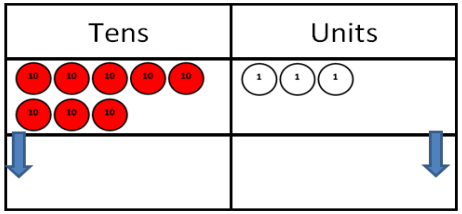
Lower Key Stage 2:

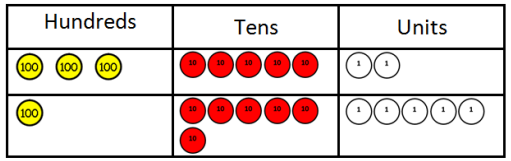
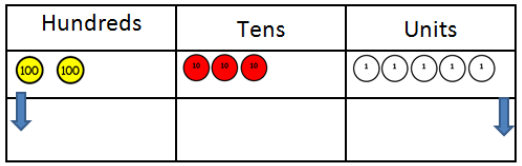
- The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

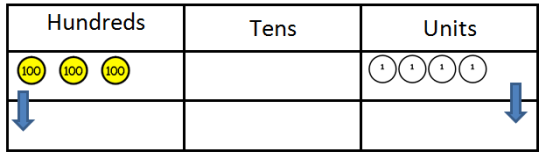
- At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

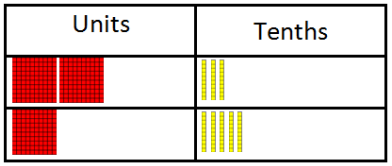
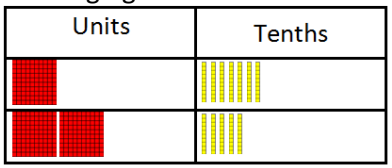
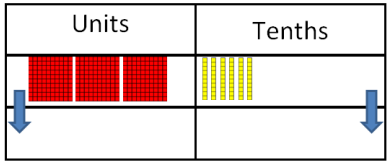
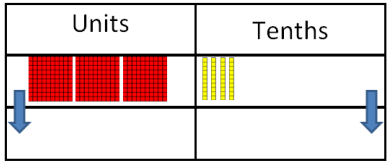
End of year expectations	Rapid recall	Mental calculation	Language	Using and applying
Year 3	Bonds to 100 with multiples of 10 and 5 Bonds to 1000 with multiples of 100	HTU ± U HTU ± T HTU ± H TU ± TU by adjusting near multiples of 10 e.g. 26 + 39 (round to 26 + 40 = 66) adjust answer 26 + 39 = 65 Any bond to 100 e.g. 34 + ? = 100, or 100 - ? = 27 *Mentally* calculate bonds to 1000 with multiples of 50 e.g. 450 + ? = 1000 or 1000 - ? = 150	Carry Exchange Compact Expanded Boundary Column	Solve one and two step problems, including missing number problems, using number facts, place value and more complex addition and subtraction.
Year 4	Bonds to 100 with any 2 digit number Bonds to 1000 with multiples of 50	TU ± TU Bonds to 1000 with multiples of 25	Increase Decrease Tenths Hundredths	Solve addition and subtraction **two-step** problems in contexts, deciding which operations and methods to use and why.

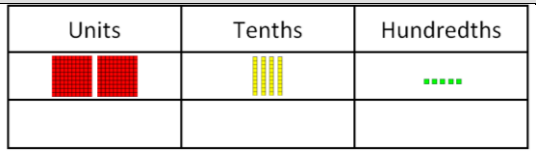
Year 3	Concrete	Pictorial	Abstract
TU + TU Expanded method: crossing tens boundaries *keeping* the new ten(s) with the units.	 28 + 37 NB: combining units but ***not*** exchanging for a 10 at this stage.  28 + 37	Expanded method $\begin{array}{r} 20 + 8 \\ +\,30 + 7 \\ \hline 50 + 15 \end{array} = 65$ **NB: new ten(s) are kept with the units at this stage.**	**NB: TU ± TU should become a mental method so compact column method would not be used at this stage.** These examples are to help children develop the concept of exchanging and bridging across boundaries.

Year 3	Concrete	Pictorial	Arithmetic	Abstract
TU + TU Crossing the tens boundary. **NB: TU±TU should be a mental calculation. This is for illustrative purposes to help children understand exchanges with HTU ± HTU**	 28 + 37 Combining the units and exchanging for a new 10.  28 + 37	Expanded method crossing the tens boundary. 20 + 8 + 30 + 7 60 + 5 = 65 10	Compact column method. 28 + 37 65 1 Missing number problems. 32 + 49 = □ □ + 73 = 94 16 + □ = 81	In a car park, there are 28 red cars and 37 blue cars. How many cars are there altogether? Use the digits 3, 4, 5 and 6. Make two 2 digit numbers. What's the highest/lowest **total** you can make? How can you make the same total in more than one way? What is the closest total to 90 you make?
TU – TU Expanded method with exchanging from the tens to the units.	 83 – 54 (Move 54 down to show what's left – exchange a ten for units).  	Expanded method. 70 ~~80~~ +13 - 50 + 4 40 + 7 = 47	Compact column method. 7 ~~8~~ 13 - 5 4 4 7 Missing number problems. 85 – 37 = □ □ – 26 = 55 91 - □ = 38	There were 83 cars in the car park. At lunchtime, 54 cars left. How many remained? Choose a 2 digit number between 81 and 99. How many subtractions can you create using your number which have a 4 in the answer? Can you find any patterns?

Year 3	Concrete	Pictorial	Arithmetic	Abstract
HTU ± TU **HTU ± HTU** NB: Crossing one boundary only at this stage. (Follow progression shown in **TU ± TU**)	 352 + 165 Combining the tens and exchanging for a 100. Placing the new 100 underneath the hundreds column.  235 – 83 (Move 83 down to show what's left – exchange a hundred for tens).	Expanded methods crossing tens ***or*** hundreds boundaries but ***not*** both. 300 + 50 + 2 + 100 + 60 + 5 500 + 10 + 7 = 517 100 100 ~~200~~ + 130 + 5 - 80 + 3 100 + 50 + 2 = 152	Leading to compact column methods and missing number problems crossing tens ***or*** hundreds boundaries but ***not*** both. 352 + 165 517 1 1 ~~2~~13 5 - 8 3 1 5 2 352 – 165 = □ □ – 165 = 517 352 - □ = 517	Use the digits 1, 2, 3, 4 and 5. Make a 2 digit and a 3 digit number. Add them together. Find ways you can make 168, 483, 339. Use the digits 0, 1, 2, 3 and 4. Make a 3 digit number then reverse the digits. Add your two numbers. Repeat with other examples. What do you notice? Two 3 digit numbers have a difference of 125. The digits of one number add to make 8. What are the numbers? How many ways can you solve this?

Year 4	Concrete	Pictorial	Arithmetic	Abstract
HTU ± HTU Crossing both boundaries.	Follow methods shown in Year 3 using apparatus to cross both boundaries. E.g. 438 + 385 = 624 – 257 =	Expanded methods.	Compact column methods.	My book has 426 pages. I am on page 137. How many more pages do I have to read until I am half way through my book? Use the digits 1 – 9. Choose six of them and make two 3 digit numbers. Find the total/difference. Score a point for every zero you can get in your total.
HTU - HTU Exchanging through a zero.	 304 – 137 (Move 137 down to show what's left – exchange a hundred for tens; then exchange a ten for units).	304 – 137 = 200 90 ~~300~~ + ~~100~~ + 14 - 100 + 30 + 7 100 + 60 + 7 = 167	304 – 137 = 2 9 ~~3~~ ~~1~~ 14 - 1 3 7 1 6 7	Use the digits 2 to 8 and make two 3 digit numbers. Find the difference. What's the closest difference you get to …400? How many pairs of numbers can you find where the difference is: a 3 digit number with consecutive digits? e.g. 572 – 449 = 123
ThHTU ± ThHTU	Follow process shown in Year 3. • Addition crossing one boundary. • Addition crossing more than one boundary. • Subtraction with exchanging through one boundary. • Subtraction with exchanging through more than one boundary. • Subtraction with exchanging through zero.	NB: it is expected that children should already be confident with using compact column methods at this stage.	Compact column methods.	I walked 1360m, 2764m and then 2188m. How much further do I have to walk until I have travelled 7 km? Use the following numbers: 2, 2, 3, 4, 4, 5, 7, 7, 8, 8 and 9. Make a pair of 4 digit numbers with a difference of: 1, 10, 100, 1000. How many ways can you do it?

Year 4	Concrete	Pictorial	Arithmetic	Abstract
U.t ± U.t	Addition without crossing boundaries:  2.3 + 1.5 Exchanging tenths for a new unit:  1.7 + 2.5 NB:place new unit underneath the uints column. Subtraction without crossing boundaries:  3.6 – 2.1 (Move 2.1 down to show what's left). Exchanging a unit for tenths.  3.4 – 1.7 (Move 1.7 down to show what's left).	Expanded methods. 2 + 0.3 + 1 + 0.5 3 + 0.8 = 3.8 1 + 0.7 + 2 + 0.5 4 + 0.2 = 4.2 1 3 + 0.6 - 2 + 0.1 1 + 0.5 = 1.5 2 1.4 ~~3~~ + ~~0.4~~ - 1 + 0.7 1 + 0.7 = 1.7	Compact column methods and missing number sentences. 2.3 + 1.5 3.8 1.7 + 2.5 4.2 1 3.6 -2.1 1.5 2 ~~3~~.14 -1.7 1.7 5.7 - □ = 1.8 □ + 4.9 = 7.2 □ – 3.6 = 1.5	I ran across the playground in 9.4 seconds. My brother was 1.5 seconds faster than me. My sister was 2.7 seconds slower than my brother. How long did my sister take to run across the playground? Use the digits 0 to 9. Make two decimals (units and tenths). Add them together. How many pairs can you make with a total of 10?

Year 4	Concrete	Pictorial	Arithmetic	Abstract
U.th ± U.th	 Develop process shown in U.t ± U.t • Addition crossing one boundary. • Addition crossing more than one boundary. • Subtraction with exchanging through one boundary. • Subtraction with exchanging through more than one boundary. • Subtraction with exchanging through zero.	Expanded methods to develop concepts of place value with hundredths.	Compact column methods.	Any 2 books cost £8.00 in a sale. The price of my books would have been £3.89 and £5.75 before the sale. How much money did I save by buying the books in the sale? Use the digits 1 to 9. Make 3 decimals (units tenths and hundredths) and subtract them from 20. What's the closest answer to zero you can make? Use the digits 1 to 9. Make 2 decimals (unit, tenths and hundredths). Find the difference. How many differences can you find which equal 1.23?

Upper Key Stage 2:

- The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

- At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems.

- By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.

End of year expectations	Rapid recall	Mental calculation	Language	Using and applying
Year 5	Decimal bonds to 1 d.p. to any whole number e.g., 3.6 up to 11.	Add and subtract numbers mentally with increasingly large numbers (for example: 12,462 – 2300 = 10,162). Rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.	Thousandths	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
Year 6		Perform mental calculations, including with mixed operations and large numbers. E.g., 3 x 700 + 115 = Rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy		Use their knowledge of the order of operations to carry out calculations involving the four operations 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 including interpreting remainders appropriately to the context of the problem.

Year 5	• Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). • Add and subtract decimals values up to thousandths. (Refer to process in Year 3 and 4. Children should be able to use column methods efficiently to work at this level).	I travelled to 3 different cities. The distances of my journeys were: 1982 m, 15642 m and 12108m. What was the total distance travelled in metres? How far did I travel in km? My friend travelled 31.9km, how much further did he travel than me? Use the digits 3, 4, 6 and 7. Make a 4 digit number and subtract it from 10,000. What are the largest and smallest answers? Which answer is closest to 5000? Find the digital roots of your answers. What do you notice? Use the digits 1 to 9. Make a 4 digit and a 5 digit number. Find the difference. Which pairs of numbers give you an answer closest to…80000, 75000, 70000 etc? Use the digits 1 to 9. Make 2 decimals (unit, tenths, hundredths and thousandths). Find the difference. How many differences can you find which equal 1.234? Use the digits 0 to 7. Make two decimals (units, tenths, hundredths and thousandths). Add them and find the nearest whole number to your answer. How many totals can you find where the nearest whole numbers is…4, 5, 12? Etc.
Year 6	• Use their knowledge of the order of operations to carry out calculations involving the four operations: (BIDMAS) 20 – 3 x 4 = 20 ÷ 4 + 7 = Where should the brackets go to make these correct? (2x4) + 5 = 2 x (4+5) = 8 x 6 – 3 = 24 8 x 6 – 3 = 45 • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.	