Parkland
Primary School
Learning together

Arithmetic and mental strategies

Counting forwards and backwards Children first meet counting by beginning at one and counting on in ones. Their sense of number is extended by beginning at different numbers and counting forwards and backwards in steps, not only of ones, but also of twos, fives, tens, hundreds, tenths and so on. The image of a number line helps them to appreciate the idea of counting forwards and backwards. They will also learn that, when they add two numbers together, it is generally easier to count on from the larger number rather than the smaller. You will need to review children's 'counting on' strategies, then show them and encourage them to adopt more efficient methods.

Reordering Sometimes a calculation can be more easily worked out by changing the order of the numbers. The way in which children rearrange numbers in a particular calculation will depend on which number facts they can recall or derive quickly. It is important for children to know when numbers can be reordered: e.g. 2 + 5 + 8 = 8 + 2 + 5 or 15 + 8 – 5 = 15 – 5 + 8 or 23 – 9 – 3 = 23 – 3 – 9 and when they can't be reordered: e.g. 8 – 5 ! 5 – 8 The strategy of changing the order of numbers applies mainly when the question is written down. It is more difficult to reorder numbers if the question is presented orally

Partitioning: counting on or back It is important for children to know that numbers can be partitioned into, for example, hundreds, tens and ones, so that 326 = 300 + 20 + 6. In this way, numbers are seen as wholes, rather than as a collection of single digits in columns. This way of partitioning numbers can be a useful strategy for adding and subtracting pairs of numbers. Both numbers can be partitioned, although it is often helpful to keep the first number as it is and to partition just the second number.

Partitioning: **bridging through multiples of 10** An important aspect of having an appreciation of number is to know how close a number is to the next or the previous multiple of 10: to recognise, for example, that 47 is 3 away from 50, or that 47 is 7 away from 40. In mental addition or subtraction, it is often useful to count on or back in two steps, bridging a multiple of 10. The empty number line, with multiples of 10 as 'landmarks', is helpful, since children can visualise jumping to them. For example, 6 + 7 is worked out in two jumps, first to 10, then to 13

Partitioning: compensating This strategy is useful for adding and subtracting numbers that are close to a multiple of 10, such as numbers that end in 1 or 2, or 8 or 9. The number to be added or subtracted is rounded to a multiple of 10 plus or minus a small number. For example, adding 9 is carried out by adding 10, then subtracting 1; subtracting 18 is carried out by subtracting 20, then adding 2. A similar strategy works for adding or subtracting decimals that are close to whole numbers. For example: 1.4 + 2.9 = 1.4 + 3 – 0.1 or 2.45 – 1.9 = 2.45 – 2 + 0.1.

Partitioning: using 'near' doubles If children have instant recall of doubles, they can use this information when adding two numbers that are very close to each other. So, knowing that 6 + 6 = 12, they can be encouraged to use this to help them find 7 + 6, rather than use a counting on strategy or bridging through 10.

Partitioning: bridging through 60 to calculate a time interval Time is a universal non-metric measure. A digital clock displaying 9.59 will, in two minutes time, read 10.01 not 9.61. When children use minutes and hours to calculate time intervals, they have to bridge through 60. So to find the time 20 minutes after 8.50am, for example, children might say 8.50am plus 10 minutes takes us to 9.00am, then add another 10 minutes

Year 1	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Addition and subtraction	• To partition numbers 3, 4, 5, 6 • Adding and subtracting 1 within 10	• Adding and subtracting 2 within 10 • Partition numbers 7, 8, 9	• Double numbers to 5 (e.g. 4 + 4) • Number bonds to ten (e.g. 2+ 8 and 8+2) • represent and use number bonds and related subtraction facts within 20 • add and subtract one-digit and two-digit numbers to 20, including zero		• Adding 10 to a number (e.g. 5 + 10 and 10+5)	• Near doubles (e.g. 3 + 4 and 4+ 3)
Multiplication and division	Count in multiples of 2 up to 24, linking with even numbers and supporting doubles.	Count in multiples of 10 in order up to 120.		Count in multiples of 5 up to 60, linking with knowledge of counting in 10s. Continue to develop fluency of **counting** in 2s and 10s.		**Count** in multiples of 10, 2 and 5 in order with growing fluency. **Count** in multiples of 10, 2 and 5 in order fluently. **Begin to recall** multiples of 10 up to 12x10 with growing fluency.
Double and half				Double all numbers to 10, e.g. double 9		
Mental Strategies to use	Counting • **reorder** numbers when adding, e.g. put the larger number first • **count on** or **back** in ones, twos or tens					

Partitioning

- **Bridging**- partition small numbers, e.g. 8 + 3 = 8 + 2 + 1
- **Partition and combine** tens and ones
- **Near doubles**: double and adjust, e.g. 5 + 6 = 5 + 5 + 1

Examples

Strategies		Example calculation	Explanation of strategy
Counting	• **reorder** numbers when adding, e.g. put the larger number first	2 + 7	7 + 2
	• **count on** or **back** in ones, twos or tens	4 + 5	Count in ones from 4 (or in ones from 5)
		5 - 4	Count back in ones from 8
Partitioning	• Partitioning using **'near doubles'**	6 + 7	Is double 6 and add 1 e.g. 6 + 6 + 1
	• **Bridging** by partitioning small numbers	8 + 3	8 + 2 (10) + 1 Bridging to the nearest 10. Modelling of re-ordering is also necessary e.g. 3 + 8 , reorder to 8 + 3.

Year 2

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Addition and subtraction (mentally)	• Review number bonds to 10 • Review adding ad subtracting to 10 • Partition numbers 11-20	• Number bonds with 20 deriving from number bonds to 10 • Use related number bonds for number bonds to 100	• Doubles to 10 (e.g. 7+7)	• Near Doubles (e.g. 5+6 and 6+5)	• Bridging tens (e.g. 8+4)	• Compensating
Written addition and subtraction	• 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					
Multiplication and division	Consolidate **counting** in multiples of 2, 5 and 10 in order from 0 up to 12x. Recall multiples of 10 up to 12x10 fluently, in any order.	**Count** in multiples of 2 and 5 from 0 up to 12x fluently. **Recall** multiples of 10 up to 10 x 12 in any order, including missing numbers and related division facts with growing fluency.	Recall multiples of 2 up to 2 x 12 fluently, in any order Recap multiples of 10 up to 10 x 12 fluently. Teaching of times table facts and methods, including arrays.	Recall multiples of 5 up to 5 x 12 fluently, in any order. **Recall** multiples of 2 up to 2 x 12 in any order, including missing numbers and related division facts with growing fluency.	Count in multiples of 3 to 3 x 12 in order from 0 with growing fluency. **Recall** multiples of 2 up to 2 x 12 in any order, including missing numbers and	**Count** in multiples of 3 to 3 x 12 in order from 0 with fluency. **Begin to recall** multiples of 3 up to 3 x 12 in any order, including missing numbers. .

					related division facts fluently. Recall multiples of 5 up to 5 x 12 in any order, including missing numbers and related division facts with growing fluency.	
Fractions				• recognise, find, name and write fractions 1/3 , ¼, 2/4 , ¾ of a quantity • Find 1 2 , 1 3 , 1 4 , 1 5 and 1 10 of numbers • Find half of any even number to 40 or multiple of 10 to 100, e.g. halve 80 Find half of any multiple of 10 up to 200, e.g. halve 170		
Double and half			• Double all numbers to 20 and find the corresponding halves, e.g. double 7, half of 14	• Double multiples of 10 to 50, e.g. double 40, and find the corresponding halves	• Double multiples of 5 to 50 and find the corresponding halves, e.g. double 35, half of 70	
Mental Strategies to use	Counting • reorder numbers when adding, e.g. put the larger number first • count on or back in ones, twos or tens					

	Partitioning • Bridging: bridge through 10 and multiples of 10 when adding and subtracting • partition and combine multiples of tens and ones • use knowledge of pairs making 10 • partition and count: count on in tens and ones to find the total • partition and count: count on or back in tens and ones to find the difference • Compensating : add a multiple of 10 and adjust by 1 • Near doubles: double and adjust

Examples

Strategies		Example calculation	Explanation of strategy
Counting	• reorder numbers when adding, e.g. put the larger number first or linking numbers together that are number bonds	5 + 34	34 + 5 = 39
		5 + 7 + 5	5 + 5 + 7 (using knowledge of number bonds to make 10 first, then to add 7)
		23 + 54	54 + 23
	• count on or back in ones, twos or tens	23 + 5	Count in ones from 23
		57 – 3	Count back in ones from 57
		27 + 60	Count on in tens from 27 (37, 47, 57, 67, 77, 87)
		72 – 50	Count back in tens from 72 (62,52,42,32,22)
Partitioning	• Partitioning using 'near doubles'	6 + 7	Is double 6 and add 1 e.g. 6 + 6 + 1
		13 + 14	Double 13 and add 1 or Double 14 and subtract 1
		39 + 40	Double 40 and subtract 1
	• Bridging by partitioning small numbers to bridge to multiples of 10	5 + 8	5 + 5 + 3 (partitioning the 8 in to 5 and 3) Bridging to the nearest 10.
		65 + 7	65 + 5 + 2 (partition the 7 in to 5 and 2, and add this on to 65)
		24 – 19	19 + 1 + 4 (bridging to find the difference between 19 and 24)

	• Partition and combine	69 – 45	60 + 9 – 40 + 5 = 60 – 40 + 9 – 5 partition the two digit numbers, then subtract the tens and then subtract the ones.
		55 + 37	55 + 30 + 7 = 85 + 7 partition the tens and ones in the smallest number, then add the tens and ones
		23 + 45	20 + 3 + 40 + 5 = 20 + 40 + 3 + 5 partition the two , two – digit numbers in to tens and ones. Then add the tens together, then the ones.
	• Compensating	34 + 9	34 + 10 – 1 round the 9 in to 10, add this on to 34, then subtract one as one more was added than necessary.
		70 – 9	70 – 10 + 1 round the 9 in to 10, subtract this from 70, then add one as too many were taken away

Year 3

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Addition and subtraction (mentally)	• addition and subtraction facts for all numbers to 20, e.g. 9 + 8, 17 – 9, drawing on knowledge of inverse operations	• addition doubles for multiples of 10 to 100, e.g. 90 + 90 • pairs of two-digit numbers with a total of 100, e.g. 32 + 68, or 32 + ♦ = 100 • add or subtract a two-digit number to or from a multiple of 10, e.g. 50 + 38, 90 – 27	• add and subtract groups of small numbers, e.g. 5 – 3 + 2 • sums and differences of multiples of 10, e.g. 50 + 80, 120 – 90 • =	• add and subtract two-digit numbers e.g. 34 + 65, 68 – 35 And a three-digit number and ones ♣ a three-digit number and tens ♣ a three-digit number and hundreds	• • add near doubles, e.g. 18 + 16, 60 + 70	• Adding and subtracting time amounts mentally using counting on and bridging
Written addition and subtraction	add and subtract numbers mentally, including: • a three-digit number and ones • a three-digit number and tens • a three-digit number and hundreds • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction • solve problems, including missing number problems					
Multiplication and division (mental)	Consolidate the 2, 5 and 10 times table. Understand how to move one place value	Recall multiples of 3 up to 3 x 12 in any order, including missing numbers and related division facts with growing fluency. anything	Recall multiples of 3 from 3 x 0 up to 3 x 12 in any order, including missing numbers and related division facts fluently.	Count in multiples of 8 to 8 x 12 in order from 0 fluently.	Recall multiples of 4 from 4 x 0 up to 4 x 12 in any order, including missing numbers and related division facts fluently.	Recall multiples of 8 from 8 x 0 up to 8 x 12 in any order, including missing numbers and

	and use zero as a place holder to multiply and divide by 10. Recall multiples of 4 up to 4 x 12 in order with fluently.. Continue to count in multiples of 3 to 3 x 12 in order from 0 fluently.	Understand that anything multiplied by zero is zero. Understand that multiplied by 1 stays the same. Recall multiples of 4 to 4 x 12 in order from 0 fluently. Introduce and begin to count in multiples of 8 from 0 to 8 x 12 using arrays and relating to 4 times table.	Recognise any multiple of 3 (all multiples of 3 have a digital root of 3, 6 or 9). Recall multiples of 4 from 4 x 0 up to 4 x 12 in any order, including missing numbers and related division facts with growing fluency. Count in multiples of 8 to 8 x 12 in order from 0 with growing fluency		Recognise that doubling and doubling again is equivalent to multiplying by 4. Recall multiples of 8 from 8 x 0 up to 8 x 12 in any order, including missing numbers and related division facts with growing fluency. Fluently count in multiples of 6 in order up to 6 x 12, using multiples of 3 to support Recognise that even multiples of 3 are also multiples of 6.	related division facts fluently. Recall multiples of 6 from 6 x 0 to 6 x 12 in any order, including missing numbers and related division facts with growing fluency
Written multiplication				• Two by one digit multiplication • Solve problems missing number problems, involving multiplication and division,		
Fractions					• recognise, find and write fractions of a discrete set of objects: unit	

					fractions and nonunit fractions with small denominators • add and subtract fractions with the same denominator within one whole • Find unit fractions and simple non-unit fractions of whole numbers or quantities, e.g. 3 8 of 24	
Double and half		Double multiples of 10 to 100, e.g. double 90, and corresponding halves Double multiples of 5 to 100 and find the corresponding halves, e.g. double 85, halve 170				
Mental Strategies to use	Counting • reorder numbers when adding • identify pairs totalling 10 or multiples of 10					
	Partitioning • partition: add tens and ones separately, then recombine • partition and count: count on in tens and ones to find the total • partition and count: count on or back in tens and ones to find the difference • Compensating: add or subtract 10 or 20 and adjust • Near doubles: double and adjust					

Examples

Strategies		Example calculation	Explanation of strategy
Counting	• **reorder** numbers when adding, e.g. put the larger number first or linking numbers together that are number bonds	6 + 13 + 4 + 3	6 + 4 + 13 + 3 reordering to add number bonds to 10 then the rest
		58 + 47 – 38	58 – 38 + 47
		25 + 36 + 75	25 + 75 + 36
	• **count on** or **back** in ones, twos or tens or hundreds	50 + 38	Count on in tens then in ones from 50
		90 – 27	Count back in tens then ones from 90
		570 + 300	Count on in hundreds from 570
		124 – 47	Count back 40 from 124, then 4 to 80, then 3 to 77
Partitioning	• Partitioning using **'near doubles'**	6 + 7	Is double 6 and add 1 e.g. 6 + 6 + 1
		13 + 14	Double 13 and add 1 or Double 14 and subtract 1
		39 + 40	Double 40 and subtract 1
		60 + 70	Double 60 and add 10 or Double 70 and subtract 10
	• **Bridging** by partitioning small numbers to bridge to multiples of 10	49 + 32	49 + 1 + 31 partition 32 in to 31 and 1, to bridge to the next multiple of 10.
		90 – 27	27 + 3 + 60 using bridging to find the difference
		24 – 19	19 + 1 + 4 (bridging to find the difference between 19 and 24)
	• **Bridging through 60 to calculate a time interval**	It is 10.30am. How many minutes to 11.15am?	Add 30mins from 10:30 to 11:00 to make 60 minutes, then add 15 mins to make 11:15am. Modelling on a number line will support this understanding.
	• **Partition and combine**	69 – 45	60 + 9 – 40 + 5 = 60 – 40 + 9 – 5 partition the two digit numbers, then subtract the tens and then subtract the ones.
		55 + 37	55 + 30 + 7 = 85 + 7 partition the tens and ones in the smallest number, then add the tens and ones
		23 + 45	20 + 3 + 40 + 5 = 20 + 40 + 3 + 5 partition the two , two – digit numbers in to tens and ones. Then add the tens together, then the ones.
	• **Compensating**	34 + 9	34 + 10 – 1 round the 9 in to 10, add this on to 34, then subtract one as one more was added than necessary.
		70 – 9	70 – 10 + 1 round the 9 in to 10, subtract this from 70, then add one as too many were taken away

Year 4

	Autumn		Spring		Summer	
Addition and subtraction mental	Recap skills of year 3	• sums and differences of pairs of multiples of 10, 100 or 1000 • addition doubles of numbers 1 to 100, e.g. 38 + 38, and the corresponding halves • what must be added to any three-digit number to make the next multiple of 100, e.g. 521 + ♦ = 600	• add or subtract a near multiple of 10, e.g. 56 + 29, 86 – 38 • add near doubles of two digit numbers, e.g. 38 + 37 • add or subtract two-digit or three-digit multiples of 10, e.g. 120 – 40, 140 + 150, 370 – 180			
Addition and subtraction written		add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate				
Multiplication and division	Recall multiples of 3, 4 and 8 up to x12 in any order, including missing numbers and related division facts fluently. Recall multiples of 6 in any order, including missing numbers and	Fluently count in multiples of 7 in order up to 7 x 12.	Recall multiples of 6 in any order, including missing numbers and related division facts fluently. Recall multiples of 7 in any order, including	Recall multiples of 7 in any order, including missing numbers and related division facts fluently. Fluently count in multiples of	Recall multiples of 9 in any order, including missing numbers and related division facts with growing fluency	Recall multiples of 9 in any order, including missing numbers and related division facts fluently. Recall multiples of 12 in any order, including missing numbers and

	related division facts with growing fluency.		missing numbers and related division facts with growing fluency. Learn 'tricky' facts using mnemonics e.g. "7 x 7 = 49, one short of 50 all the time."	9 in order up to 9 x 12. **Understand** that multiples of 9 have a digital root of 9 – learn the finger trick Fluently **count** in multiples of 11 in order up to 11 x 12.	(using 10x and adjusting by 1 group to find 9x as a strategy) **Recall** multiples of 11 in any order, including missing numbers and related division facts fluently (using 10x and adjusting by adding 1 more group). Fluently **count** in multiples of 12 in order up to 12x12.	related division facts with growing fluency (using 10x and adjusting by adding 2 more groups).
Double and halving		Double any two-digit number and find the corresponding halves, e.g. double 47, half of 94 Double multiples of 10 and 100 and find the corresponding halves, e.g. double 800, double 340, half of 1600, half of 680				
Written multiplication and division			• use place value, known and derived facts to multiply and	•		

			divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers • multiply two-digit and three-digit numbers by a one-digit number using formal written layout			
Fractions				• add and subtract fractions with the same denominator • find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths • Find half of any even number to 200 Find unit fractions and simple non-unit fractions of whole numbers or quantities, e.g. 3 8 of 24		

				• Recall fraction and decimal equivalents for one-half, quarters, tenths and hundredths, e.g. recall the equivalence of 0.3 and 3 10 , and 0.03 and 3 100		
Mental strategies	Counting • count on or back in hundreds, tens and ones • subtract by counting up from the smaller to the larger number					
	Partitioning • partition: add tens and ones separately, then recombine • partition: subtract tens and then ones, e.g. subtracting 27 by subtracting 20 then 7 • Compensating: add or subtract a multiple of 10 and adjust, e.g. 56 + 29 = 56 + 30 – 1, or 86 – 38 = 86 – 40 + 2 • Near double: double and adjust					
	Place Value knowledge • use knowledge of place value and related calculations, e.g. work out 140 + 150 = 290 using 14 + 15 = 29					
	Adjusting • Knowing that difference stays the same- 129-9 = 130-10 = 10 (adding one to both) • Making the calculation easier 29 + 9 = 28+ 10					

Strategies		Example calculation	Explanation of strategy
Counting	• **reorder** numbers when adding, e.g. put the larger number first or linking numbers together that are number bonds	6 + 13 + 4 + 3	6 + 4 + 13 + 3 reordering to add number bonds to 10 then the rest
		17 + 9 – 7	17 – 7 + 9
		28 + 75	75 + 28 (thinking of 28 as 25 + 3)
	• **count on** or **back** in ones, twos or tens or hundreds	47 + 58	count on 50 from 47, then 3 to 100, then 5 to 105
		124 – 47	count back 40 from 124, then 4 to 80, then 3 to 77
		570 + 300	Count on in hundreds from 570
		124 – 47	Count back 40 from 124, then 4 to 80, then 3 to 77
		960 – 500	count back in hundreds from 960
	• **subtract by counting up from the smaller to the larger number**	73 – 68	count up from 68, counting 2 to 70 then 3 to 73
Partitioning	• Partitioning using **'near doubles'**	76 + 75	is double 76 and subtract 1 or double 75 and add 1
	• **Bridging** by partitioning small numbers to bridge to multiples of 10	57 + 34	57 + 3 + 31 Bridging to 60 by adding 3 and add the remaining 31
		92 – 25	92 – 2 – 20 – 3 Bridging to 90 by subtracting 2 then subtract the remaining
		84 – 35	35 + 5 + 40 + 4
	• **Bridging through 60 to calculate a time interval**	I get up 40 minutes after 6.30am. What time is that?	Use a numberline to model 6:30 + 30 minutes = 7:00 7:00 + 10 minutes = 7:10am
		What is the time 50 minutes before 1.10pm?	Use numberline and clock face to moel 1:10 – 10 minutes =1:00 1:00 = 30 minutes = 12:30 then take away a further 10 Or know that 50 is 10 minutes less than 1 hour. Take away one hour = 12:10 and add 10 minutes = 12:20
		It is 4.25pm. How many minutes to 5.05pm?	Use numberline to model 4:25 -> 4:30 = +5 minutes 4:30 -> 5:00 = +30 minutes 5:00 -> 5:05 = + 5 minutes = 40 minuets
	• **Partition and combine**	69 – 45	60 + 9 – 40 + 5 = 60 – 40 + 9 – 5 partition the two digit numbers, then subtract the tens and then subtract the ones.
		55 + 37	55 + 30 + 7 = 85 + 7 partition the tens and ones in the smallest number, then add the tens and ones

		365 – 40	300 + 60 + 5 – 40 = 300 + 60 – 40 + 5 partition the two , two/three – digit numbers in to hundreds, tens and ones. Then add the hundreds together, then tens together, then the ones.
	• Compensating	38 + 68	38 + 70 – 2 – round the 68 to 70, add this on to 38, then subtract two as two more was added than necessary.
		95 – 78	95 – 80 + 2– round the 78 to 80, subtract this from 95, then add one as too many were taken away
		58 + 32	58 + 30 + 2
		64 – 32	64 – 30 – 2

Year 5

	Autumn	Spring	Summer
Addition and subtraction (mental)	• Recap Year 4 • what must be added to any four-digit number to make the next multiple of 1000, e.g. 4087 + ♦ = 5000 • add or subtract a pair of twodigit numbers or three-digit multiples of 10, e.g. 38 + 86, 620 – 380, 350+ 360 • add or subtract a near multiple of 10 or 100 to any two-digit or three-digit number, e.g. 235 + 198 • find the difference between near multiples of 100, e.g. 607 – 588, or of 1000, e.g. 6070 – 4087	• sums and differences of decimals, e.g. 6.5 + 2.7, 7.8 – 1.3 • doubles and halves of decimals, e.g. half of 5.6, double 3.4 • • what must be added to a decimal with units and tenths to make the next whole number, e.g. 7.2 + ♦ = 8 • add or subtract any pairs of decimal fractions each with units and tenths, e.g. 5.7 + 2.5, 6.3 – 4.8 •	
Addition and subtraction	• Add and subtract numbers greater than 4 digits		
Multiplication and division	**Recall** multiples of 12 in any order, including missing numbers and related division facts fluently. **Recall** multiples of all times tables up to 12x12 in any order, including missing numbers and related division facts with fluency • squares to 12 × 12 • division facts corresponding to tables up to 10 × 10, and the related	Develop **fluency** in multiplication, using **efficient methods** and **recognising the properties of multiples**. For example: nd divide by 10, 100 or 1000 fluently using place value. ply by 10 and halve to multiply large numbers by 5. e and double again to multiply large numbers by 4. 0 and subtract one group to multiply large numbers by 9. ise large multiples of 3 and 6 using the digital root.	

	unit fractions, e.g. 7 × 9 = 63 so one-ninth of 63 is 7 and one-seventh of 63 is 9 • percentage equivalents of one-half, one-quarter, three-quarters, tenths and hundredths • factor pairs to 100 • Cube numbers	y knowledge of times tables to multiply multiples Multiply 3 numbers efficiently using **jottings** e.g. 4 x 7 x 9 = Apply knowledge of all times tables in long multiplication.
Double and halving	• multiply by 5 by multiplying by 10 then halving, e.g. 18 × 5 = 180 ÷ 2 = 90 • multiply by 20 by doubling then multiplying by 10, e.g. 53 × 20 = 106 × 10 = 1060 Multiply by 50 by multiplying by 100 and halving Multiply by 25 by multiplying by 100 and halving twice	Form equivalent calculations and use doubling and halving, e.g. • multiply by 4 by doubling twice, e.g. 16 × 4 = 32 × 2 = 64 • multiply by 8 by doubling three times, e.g. 12 × 8 = 24 × 4 = 48 × 2 = 96 • divide by 4 by halving twice, e.g. 104 ÷ 4 = 52 ÷ 2 = 26 • divide by 8 by halving three times, e.g. 104 ÷ 8 = 52 ÷ 4 = 26 ÷ 2 = 13
Written multiplication and division	multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers ♣ multiply and divide numbers mentally drawing upon known facts ♣ divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context ♣ multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)	
Fractions and decimals		• add and subtract fractions with the same denominator and denominators that are multiples of the same number • multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams • solve problems involving number up to three decimal places • solve problems which require knowing percentage and decimal equivalents of 2 1 , 4 1 , 5 1 , 5 2 , 5 4 and those fractions with a denominator of a multiple of 10 or 25. • Find fractions of whole numbers or quantities, e.g. 2 3 of 27, 4 5 of 70kg Find 50%, 25% or 10% of whole numbers or quantities, e.g. 25% of 20kg, 10% of £80

Mental strategies	Counting • count on or back in hundreds, tens, ones and tenths • subtract by counting up from the smaller to the larger number
	Partitioning • partition: add hundreds, tens or ones separately, then recombine • Compensating: add or subtract a multiple of 10 or 100 and adjust • Near doubles: double and adjust
	Place Value Knowledge • use knowledge of place value and related calculations, e.g. 6.3 – 4.8 using 63 – 48
	Adjusting • Knowing that difference stays the same- 129-9 = 130-10 = 10 (adding one to both) • Making the calculation easier 29 + 9 = 28+ 10

Strategies		Example calculation	Explanation of strategy
Counting	• **reorder** numbers when adding, e.g. put the larger number first or linking numbers together that are number bonds	12 + 17 + 8 + 3	12 + 17 + 8 + 3 reordering to add number bonds to 10 then the rest
		25 + 36 + 75	25 + 75 + 36
		58 + 47 – 38	58 – 38 + 47
		200 + 567	567 + 200
		1.7 + 2.8 + 0.3	1.7 + 0.3 + 2.8
	Counting • count on or back in hundreds, tens, ones and tenths	3.2 + 0.6	count on in tenths
		See year 4	
	• subtract by counting up from the smaller to the larger number	3.3-2.9	Count up from 2.9 in tenths
Partitioning	• Partitioning using **'near doubles'**	160 + 170	is double 150, then add 10, then add 20 or double 160 and add 10 or double 170 and subtract
		607 – 288	288 + 12 + 300 + 7 Counting up from 288 to 300 and then to 607

	• **Bridging** by partitioning small numbers to bridge to multiples of 10	6070 – 4987	4987 + 13 + 1000 + 70 Counting up from 4987 to 5000 and then to 6070
	• Bridging through 60 to calculate a time interval	What time will it be 26 minutes after 3.30am?	Count in 10 minutes and then add 6 3:30, 3:40, 3:50 +6 = 3:56
		What was the time 33 minutes before 2.15pm?	Use numberline add a clock to model 2:15 – 15 minutes – 15 minutes (or one jump of 30) to 1:45 and then take away a further 3 minutes to 1:42
		It is 4.18pm. How many minutes to 5.00pm? 5.26pm?	Use numberline to model 4:18 -> + 42 minutes (or 30 +12) to 5:00 and then a further 26 to 5:26
	• Partition and combine	43 + 28 + 51	40 + 3 + 20 + 8 + 50 + 1 = 40 + 20 + 50 + 3 + 8 + 1 Partition the tens ands and then add the tens and then the ones
		5.6 + 3.7	5.6 + 3 + 0.7 = 8.6 + 0.7 – Partition the second number and then add to th first
		4.7 – 3.5	4.7 – 3 – 0.5
	• Compensating	138 + 69	138 + 70 – 1 round the 69 in to 70, add this on to 138, then subtract one as one more was added than necessary.
		405 – 399	405 – 400 + 1 round the 399 in to 400, subtract this from 405, then add one as too many were taken away

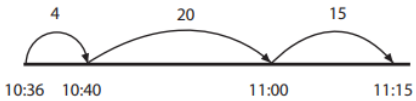
Year 6

	Autumn	Spring	Summer
Mental addition and subtraction	• addition and subtraction facts for multiples of 10 to 1000 and decimal numbers with one decimal place, e.g. 650 + ♦ = 930, ♦ – 1.4 = 2.5	• what must be added to a decimal with units, tenths and hundredths to make the next whole number, e.g. 7.26 + ♦ = 8 • add or subtract pairs of decimals with units, tenths or hundredths, e.g. 0.7 + 3.38 • find doubles of decimals each with units and tenths, e.g. 1.6 + 1.6 • add near doubles of decimals, e.g. 2.5 + 2.6 • add or subtract a decimal with units and tenths, that is nearly a whole number, e.g. 4.3 + 2.9, 6.5 – 3.8	
Written addition and subtraction	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		
Multiplication and division	**Recall** multiples of 12 in any order, including missing numbers and related division facts fluently. **Recall** multiples of all times tables up to 12x12 in any order, including missing numbers and related division facts with fluency • squares to 12 × 12	Develop **fluency** in multiplication, using **efficient methods** and **recognising the properties of multiples**. For example: 000 fluently using place value. y large numbers by 5. ly large numbers by 4. oup to multiply large numbers by 9.	

	• division facts corresponding to tables up to 10 × 10, and the related unit fractions, e.g. 7 × 9 = 63 so one-ninth of 63 is 7 and one-seventh of 63 is 9 • percentage equivalents of one-half, one-quarter, three-quarters, tenths and hundredths • factor pairs to 100 • Cube numbers	6 using the digital root. › multiply multiples Multiply 3 numbers efficiently using **jottings** e.g. 4 x 7 x 9 = Apply knowledge of all times tables in long multiplication.
Double and halving		Double decimals with units and tenths, e.g. double 7.6, and find the corresponding halves, e.g. half of 15.2 Form equivalent calculations and use doubling and halving, e.g. • divide by 25 by dividing by 100 then multiplying by 4 e.g. 460 ÷ 25 = 4.6 × 4 = 18.4 • divide by 50 by dividing by 100 then doubling e.g. 270 ÷ 50 = 2.7 × 2 = 5.4
Written multiplication and division	multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication ♣ divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context ♣ divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context ♣ perform mental calculations, including with mixed operations and large numbers Pupils explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9.	

Fractions		• add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions • multiply simple pairs of proper fractions, writing the answer in its simplest form • divide proper fractions by whole numbers • multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places • multiply one-digit numbers with up to two decimal places by whole numbers ♣ use written division methods in cases where the answer has up to two decimal places • solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison • Recall equivalent fractions, decimals and percentages for hundredths, e.g. 35% is equivalent to 0.35 or 35 100 Find half of decimals with units and tenths, e.g. half of 3.2 Find 10% or multiples of 10%, of whole numbers and quantities, e.g. 30% of 50 ml, 40% of £30, 70% of 200 g
Mental Strategies	Counting • count on or back in hundreds, tens, ones, tenths and hundredths	
	Partitioning • Near doubles: double and adjust • partition: add or subtract a whole number and adjust, e.g. 4.3 + 2.9 = 4.3 + 3 – 0.1, 6.5 – 3.8 = 6.5 – 4 + 0.2	
	Place Value Knowledge • use knowledge of place value and related calculations, e.g. 680 + 430, 6.8 + 4.3, 0.68 + 0.43 can all be worked out using the related calculation 68 + 43 • use knowledge of place value and of doubles of two-digit whole numbers	
	Adjusting • Knowing that difference stays the same- 129-9 = 130-10 = 10 (adding one to both) • Making the calculation easier 29 + 9 = 28+ 10	

Strategies		Example calculation	Explanation of strategy
Counting	• **reorder** numbers when adding, e.g. put the larger number first or linking numbers together that are number bonds	3 + 8 + 7 + 6 + 2	3 + 7 + 8 + 2 + 6reordering to add number bonds to 10 then the rest
		34 + 27 + 46	34 + 46 + 27
		180 + 650	650 + 180 (thinking of 180 as 150 + 30)

		1.7 + 2.8 + 0.3	1.7 + 0.3 + 2.8
		4.7 + 5.6 – 0.7	4.7 – 0.7 + 5.6 = 4 + 5.6
	Counting • count on or back in hundreds, tens, ones and tenths	1.7 + 0.55	count on in tenths and hundredths
		See year 4	
	• subtract by counting up from the smaller to the larger number	3.3-2.9	Count up from 2.9 in tenths
Partitioning	• Partitioning using **'near doubles'**	2.5 + 2.6	is double 2.5 and add 0.1 or double 2.6 and subtract 0.1
	• **Bridging** by partitioning small numbers to bridge to multiples of 10	1.4 + 1.7	1.4 + 0.6 + 1.1 – partition the second number and using number bonds add 0.6 to reach 2 and then add the remaining 1.1
		5.6 – 3.7	5.6 – 0.6 – 3 – 0.1
		0.8 + 0.35	0.8 + 0.2 + 0.15
		8.3 – 2.8	2.8 + 0.2 + 5.3 or 8.3 – 2.3 – 0.5
	• **Bridging through 60 to calculate a time interval**	It is 08.35. How many minutes is it to 09.15?	25 minutes to 09:00 and then 15 minutes to 09:15- combine to be 40 minutes Could use a numberline to support 
		It is 11.45. How many hours and minutes is it to 15.20?	15 minutes to 12:00 3 hours to 15:00 20 minutes to 15:20 15+20 = 35 minutes =3 hours 25 minutes Use numberline to support
		A train leaves London for Leeds at 22.33. The journey takes 2 hours 47 minutes. What time does the train arrive?	22:33 + 2 hours = 00:33 0:33 + 27 minutes = 01:00 + 20 minutes = 01:20 Use numberline to support
	• **Partition and combine**	540 + 280	540 + 200 + 80
		276 – 153	276 – 100 – 50 – 3

		43 + 28 + 51	40 + 3 + 20 + 8 + 50 + 1 = 40 + 20 + 50 + 3 + 8 + 1 Partition the tens ands and then add the tens and then the ones
	• Compensating	2½ + 1¾	2½ + 2 – ¼ round the 1¾ to 2, add this on to 2½, then subtract ¼ as ¼ more was added than necessary.
		5.7 + 3.9	5.7 + 4.0 – 0.1 round the 3.9 to 4, add this from 5.7, then subtract 0.1 as 0.1 more was added than necessary
		6.8 – 4.9	6.8 – 5.0 + 0.1 round the 4.9 to 5, subtract this from 6.8, then add 0.1 as too many were taken away