<u>Progression in Calculations</u>

This document provides guidance on the strategies and techniques used throughout the school to teach addition, subtraction, multiplication and division (the four operations).

In each year group strategies are practiced in a broad range of contexts to provide children with a solid foundation in their mathematical learning and understanding.

These strategies provide the mechanical skills which children can use to solve mathematical problems.

Children should consider first whether the calculation can be done mentally, and should use estimation to check answers to calculations.

	Addition	Subtraction	Multiplication	Division
Year 1	Children can say one more and two more. Children know number bonds to 10. Children know number bonds to 20. Children mentally add two 1-digit numbers.	Children can say one less and two less. Children know subtraction facts for number bonds to 10. Children know subtraction facts for number bonds to 20. Children subtract 1-digit from 1-digit.	Children can count in multiples of 1, 2, 5 and 10. Children know doubles of numbers to 10.	Children know halves of even numbers to 20. Children can count in groups of 1, 2, 5 and 10.

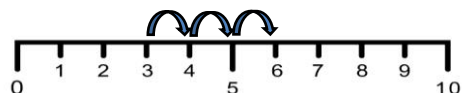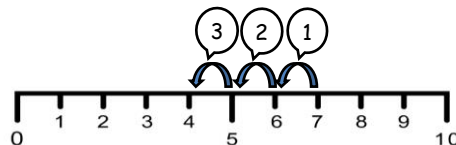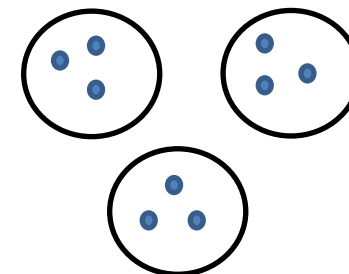|	**Addition**	**Subtraction**	**Multiplication**	**Division**
Year 1	Two groups of concrete objects used to add. Bead strings used to add. Bridging through 10 is illustrated this way. e.g. 8 + 5 add on 2 then 3. Children use number lines to add. e.g. 3 + 3 = 6 Children use number grids to add. e.g. 15 + 3 = 18 Children use number grids to add. e.g. 28 + 7 = 33	Children take away a number of objects from a bigger group. Bead strings used to subtract. Bridging through 10 is illustrated this way. e.g. 13 -5 = 8 Children use number lines to subtract. e.g. 7 – 3 = 4 Children use number grids to subtract. e.g. 17 – 4 = 13 Children use number grids to subtract. e.g. 23 - 7 = 16	Children multiply using concrete objects. Children understand multiplication as repeated addition. 2 + 2 + 2 + 2 = 8	Children will share objects into equal groups.
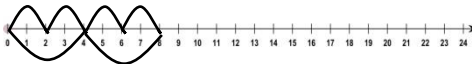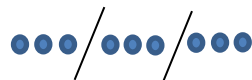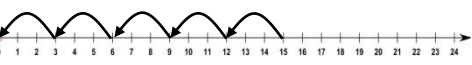
Addition number grid 1 (15 + 3 = 18):

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

Addition number grid 2 (28 + 7 = 33):

11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

Subtraction number grid 1 (17 – 4 = 13):

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

Subtraction number grid 2 (23 - 7 = 16):

11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

	Addition	Subtraction	Multiplication	Division
Year 2	Children can say ten more. Children rapidly recall addition facts to 20. Children recall pairs of tens to 100. Children can count in multiples of 1, 2, 3, 5 and 10 from any number (repeated addition). Children add 1-digit to 2-digit numbers. Children add tens to 2-digit numbers.	Children can say ten less. Children rapidly recall subtraction facts to 20. Children know subtract facts for pairs of tens to 100. Children subtract 1-digit from 2-digit numbers. Children subtract tens from 2-digit numbers.	Children recall multiplication facts for 2, 5 and 10 times tables. Children count in 2s, 3s, 5s, 10s, ½s and ¼s.	Children recall division facts for 2, 5 and 10 times tables.

	Addition	Subtraction	Multiplication	Division
Year 2	Use number grids and lines to add TU + TU by counting on in tens and ones. e.g. 36 + 22 = 58 +10　　　+10　　+1 +1 36　　　　46　　　56 57 58 Then: +10　　　+10　　　+2 36　　　　46　　　56　　58 Children partition numbers into tens and units to add. 2 4 2 0　4　　24 = 20 and 4 So 24 + 13 = 20 + 10 and 4 + 3 Using number squares and grids to support subtraction, moving on to **mental subtraction of tens and units.** Children add two 2-digit numbers using column addition. No carrying. 　24　　　　　　　　24 + 43　　moving to　+43 　　7 (4+3)　　　　67 + 60 (20+40) 　67	Use number grids and lines to subtract TU - TU by counting back in tens and ones. e.g. 35 - 23 = 12 -1 -1 -1　　-10　　　-10 12 13 14 15　　　25　　　35 Then: -3　　-10　　　-10 12 13 14 15　　　25　　　35 Children partition numbers to be subtracted into tens and units. So 45 – 32 = 45 – 30 = 15 15 – 2 = 13 Using number squares and grids to support subtraction, moving on to **mental subtraction of tens and units.** Children subtract two 2-digit numbers using column subtraction. No 'borrowing'. 　45　　　　　　　　45 -23　　moving to　- 23 　2 (5-3)　　　　　22 + 20 (40-20) 　22	Children use jumps along a number line to repeatedly add. 4 hops of 2　　　4 x 2 = 8 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 2 hops of 4　　　2 x 4 = 8 Children use arrays to support multiplication. 2 x 4 = 8　●●●● 　　　　　●●●● 4 x 2 = 8	Children will group or repeatedly subtract. ●●● / ●●● / ●●● Children repeatedly subtract using a number line. 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 15 ÷ 3 = 5 Children use arrays to support division.

	Addition	Subtraction	Multiplication	Division
Year 3	Children can say one hundred more. Children know number bonds to 100. Children add pairs of 1-digit and 2-digit numbers. Children add 1-digit to 3-digit numbers. Children add tens to 3-digit numbers. Children add hundreds to 3-digit numbers.	Children can say one hundred less. Children know subtraction facts for number bonds to 100. Children subtract 1-digit from 2-digit numbers. Children subtract 1-digit from 3-digit numbers. Children subtract tens from 3-digit numbers. Children subtract hundreds from 3-digit numbers.	Children recall multiplication facts for 2, 3, 4, 5, 8 and 10 times tables. Children multiply any number by 10. Children double tens.	Children recall division facts for 2, 3, 4, 5, 8 and 10 times tables. Children divide any number by 10. Children half tens.

	__Addition__	__Subtraction__	__Multiplication__	__Division__

Year 3	Children add 1 and 2 digits **mentally**.
	
	Children add 3-digit and ones; 3-digit and tens; 3-digit and hundreds **mentally**.
	
	Children add two 2-digit numbers using column addition. No carrying.
	
	   24 24
	+ 43 [moving to] +43
	   7 (4+3) 67
	+ 60 (20+40)
	  67
	
	Children add using standard written method (column addition).
	
	  48
	+36
	  84
	  1
		Children subtract 1 and 2 digits **mentally**.
		
		Children subtract ones from 3-digit; tens from 3-digit; hundreds from 3-digits mentally.
		
		Children subtract two 2-digit numbers using column subtraction. No 'borrowing' (exchange).
		  45 45
		 -23 [moving to] - 23
		  2 (5-3) 22
		+ 20 (40-20)
		  22
		
		Children subtract using standard written method (column subtraction).
		
		  ³¹
		  43
		- 27
		  16
			Children use jumps along a number line to repeatedly add.
			
			 4 hops of 2 4 x 2 = 8
			
			2 hops of 4 2 x 4 = 8
			
			Children use arrays to support multiplication.
			
			 2 x 4 = 8 ●●●●
			          ●●●●
			      4 x 2 = 8
			
			Multiplication facts from the times tables are used to calculate.
			
			Multiplying TU x U by partitioning.
			
			38 x 5 = (30 x 5) + (8 x 5)
			       150 + 40 = 190
				Children repeatedly subtract using a number line.
				
				15 ÷ 3 = 5
				
				Children use division facts from the times tables to divide.

	Addition	Subtraction	Multiplication	Division
Year 4	Children can say ten and one hundred more than any number at speed. Children know pairs of tens adding to 90 and 180. Children add pairs of 2-digit numbers at speed.	Children can say ten and one hundred less than any number at speed. Children know subtraction facts for pairs of tens to 90 and 180. Children subtract 2-digit from 2-digit at speed.	Children recall multiplication facts for all tables to 12 x 12. Children convert between cm and m, and cm and mm at speed.	Children recall division facts for all tables to 12 x 12. Children convert between cm and m, and cm and mm at speed.

	Addition	**Subtraction**	**Multiplication**	**Division**
Year 4	Children add up to 2 digits **mentally**. Children add up to 4 digits using standard written method (column addition). 483 +361 844 ₁	Children subtract up to 2 digits **mentally**. Children subtract up to 4-digits using standard written method (column subtraction). ^{3 1} 243 -127 116	Children Multiply 2-digit and 3-digit numbers by 1 digit using grid method. e.g. 235 x 4 | x	200	30	5
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4	800	120	20 | 800 120 + 20 940	Children repeatedly subtract using a number line. $72 \div 5 = 14 \text{ r. } 2$ -2 -5 -5 5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5 0 2 7 12 17 22 27 32 37 42 47 52 57 62 67 72 Moving onto: -2 -5 -5 -5 -5 -50 (10x5) 0 2 7 12 17 22 72 Children divide 2 and 3-digit numbers by 1-digit using vertical 'chunking' method: $100 \div 3 = \underline{33}\text{r}1$ 100 - 30 ($\underline{10}$ x 3) 70 - 30 ($\underline{10}$ x 3) 40 - 30 ($\underline{10}$ x 3) 10 - 9 ($\underline{3}$ x 3) 1 Children use short division to divide up to 3-digit number by 1-digit. 513 5)2²56¹5 | 5 into 2 doesn't go so look to the next digit. 5 into 25 goes 5 times. Write 5 on the top line. 5 into 6 goes once, remainder 1. Write 1 on the answer line, carry the remainder. 5 into 15 goes 3 times. Write 3 on the top line.

	Addition	Subtraction	Multiplication	Division
Year 5	Children recall addition facts to 100. Children add 2-digit to hundreds at speed.	Children recall subtraction facts to 100. Children subtract 2-digit from hundreds at speed.	Children use recall of tables facts to quickly recall common multiples. Children recall prime numbers to 19. Children recall square numbers. Children multiply any number by 10, 100, 1000. Children convert between l and ml; km and m at speed.	Children use recall of division facts to quickly recall common factors. Children recall square roots from times tables. Children divide any number by 10, 100, 1000. Children convert between l and ml; km and m at speed.

	Addition	Subtraction	Multiplication	Division

Year 5	Children add up to 3 digits **mentally**.
	
	Children add up to 5 digits using standard written method (column addition).
	
	   1483
	  +2361
	  3844
	
	Using the methods they have learnt children will be able to add:
	• Several numbers with different amounts of digits.
	• Add two or more decimals of up to 3 decimal places.
		Children subtract up to 3 digits **mentally**.
		
		Children subtract up to 5-digits using standard written method (column subtraction).
		
		   ³¹
		  4243
		  -2127
		  2116
		
		Using the methods they have learn children will be able to subtract:
		• Numbers of different amounts of digits.
		• Work out the difference between two decimal numbers of up to 3 decimal places.
			Children **mentally** multiply any number by 10, 100, 1000.
			
			Children use known facts from tables to multiply **mentally**.
			
			Children Multiply 2-digit and 3-digit numbers by 2 digit using grid method.
			e.g. 235 x 24
			
			<table><tr><td>x</td><td>200</td><td>30</td><td>5</td></tr><tr><td>20</td><td>4000</td><td>600</td><td>100</td></tr><tr><td>4</td><td>800</td><td>120</td><td>20</td></tr></table>4800 720 120
			
			 4800
			  720
			+ 120
			 5640
			
			Children do multiplication in stages as per grid method, laid out vertically.
			  33
			 x14
			  12 (4 x 3)
			 120 (4 x 30)
			  30 (10 x 3)
			 300 (10 x 30)
			 462
			
			Children use standard written method (long multiplication).
			  56
			 x 27
			1120
			 392
			1512
				Children **mentally** divide any number by 10, 100, 1000.
				
				Children use known fact related to tables to divide **mentally**.
				
				Children divide up to 4 digit numbers by 1-digit using vertical 'chunking' method:
				
				2533 ÷ 5 = 506 r3
				
				 2533
				-1000 (200 x 5)
				 1533
				-1000 (200 x 5)
				  533
				- 500 (100 x 5)
				   33
				- 30 (6 x 5)
				    3
				
				Fact Box
				1 x 5 = 5
				2 x 5 = 10
				5 x 5 = 25
				10 x 5 = 50
				
				In the early stages, children may make a 'fact box' to support this method.
				
				Children use short division to divide up to 4-digit number by 1-digit.
				   513
				5)2²56¹5
				
				5 into 2 doesn't go so look to the next digit.
				5 into 25 goes 5 times. Write 5 on the top line.
				5 into 6 goes once, remainder 1. Write 1 on the answer line, carry the remainder.
				5 into 15 goes 3 times. Write 3 on the top line.

	Addition	Subtraction	Multiplication	Division
Year 6	Children recall addition facts to 90, 180, 360. Children add 2-digit to 3-digit numbers at speed.	Children recall subtraction facts to 90, 180, 360. Children subtract 2-digit from 3-digit numbers at speed.	Children use recall of tables facts to quickly recall common multiples. Children recall conversion rates between simple measures. e.g. 60 seconds in 1 minute so x60 Children recall square numbers to 12^2 at speed.	Children use recall of division facts to quickly recall common factors. Children recall conversion rates between simple measures e.g. 1000m = 1km so ÷1000 Children recall square roots to √144 at speed.

Children know common equivalent fractions, decimals and percentages at speed.

Addition	Subtraction	Multiplication	Division
Children add up to 3 digits **mentally**. Children add **mentally** as part of combined operations involving all four operations. Children add up to 5 digits using standard written method (column addition). 1483 +2361 3844 Using the range of methods they have learnt children will be able to add: • Numbers of different amounts of digits. • Work out the difference between two decimal numbers of up to 3 decimal places. • Negative integers.	Children subtract up to 3 digits **mentally**. Children subtract **mentally** as part of combined operations involving all four operations. Children subtract up to 5-digits using standard written method (column subtraction). $^{3\ 1}$ 4243 -2127 2116 Using the range of methods they have learn children will be able to subtract: • Numbers of different amounts of digits. • Work out the difference between two decimal numbers of up to 3 decimal places. • Negative integers.	Children **mentally** multiply any number by 10, 100, 1000. Children use known facts from tables to multiply **mentally**. Children use standard written method (long multiplication) to multiply up to 4-digits x 2-digits. 4356 x 27 87120 30492 117612	Children **mentally** divide any number by 10, 100, 1000. Children use known fact related to tables to divide **mentally**. Children use short division to divide up to 4-digit number by 1-digit. 513 5)2²56¹5 *5 into 2 doesn't go so look to the next digit.* *5 into 25 goes 5 times. Write 5 on the top line.* *5 into 6 goes once, remainder 1. Write 1 on the answer line, carry the remainder.* *5 into 15 goes 3 times. Write 3 on the top line.* Children divide up to 4-digit by 2-digit using Long Division: 5 76 15)8640 -75↓ 114 -105↓ 90 *15 into 8 doesn't go so look at the next digit.* *15 goes into 86 five times so put a 5 above the 6.* **15 x 5=75** *Take away 75 from 86 to get the remainder 11. Carry the 4 down to make 114.* *15 goes into 114 seven times so put a 7 above the 4.* *15 x 7 = 105* *Take away 105 from 114 to get the remainder 9.* *Carry the 0 down to make 90.* *15 goes into 90 exactly 6 times so put a 6 above the 0.*

Year 6