Tenacres First School Calculation Policy 2023/2024
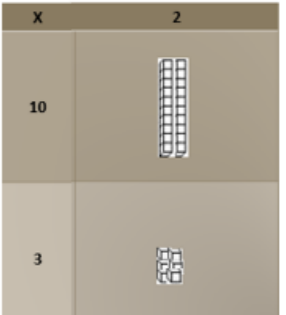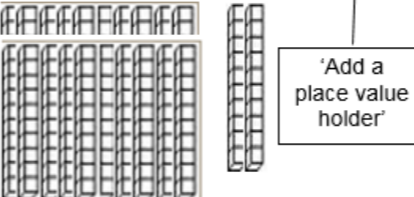
This calculation policy relies heavily upon children having a good understanding and knowledge of mental strategies.
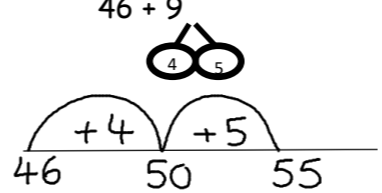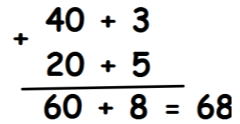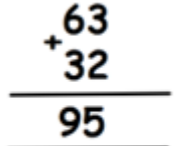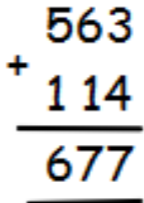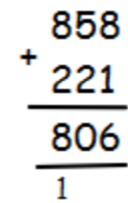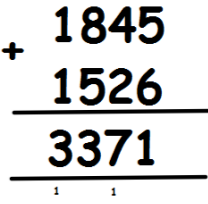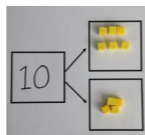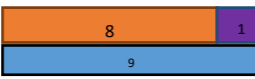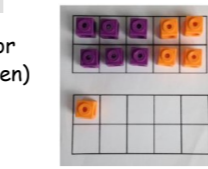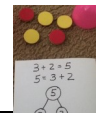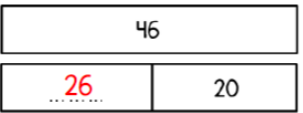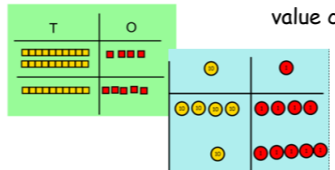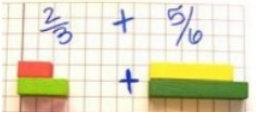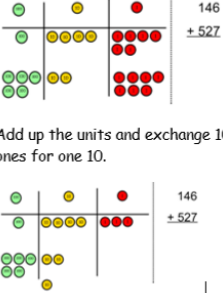
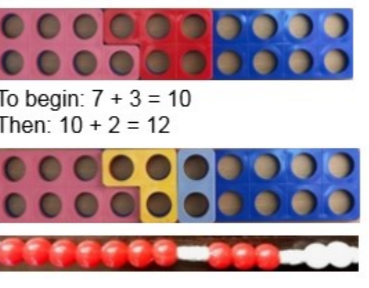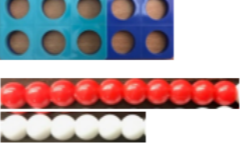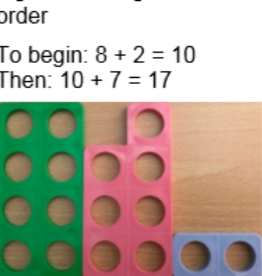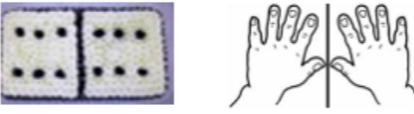Children are introduced to the processes of calculation through practical, oral and mental activities. As they begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods, so that they develop both **conceptual understanding** and **fluency** in the fundamentals of mathematics. Whilst interpreting signs and symbols involved with calculation, orally in the first instance, children use models and images to support their mental and written methods of calculation. As children's mental methods are strengthened and refined they begin to work more efficiently, which will support them with using succinct written calculation strategies as they are developed.

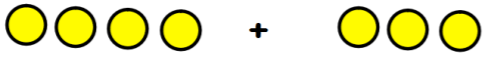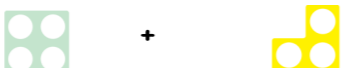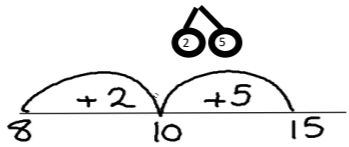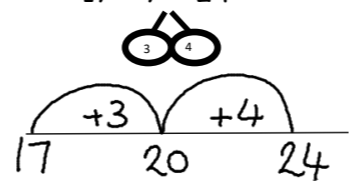| **Doubles:** 8 + 8 = 16	**Near doubles:** 6 + 7 = 13	**Number bonds:** 7 + 3 = 10
8 + 8 is connected to 8 X 2	6 + 7 is commutative with 7 + 6	
Partitioning: 14 + 12 = 26	**Bridging:** 7 + 5 = 12 To begin: 7 + 3 = 10 Then: 10 + 2 = 12	**Adjusting:** 16 + 9 = 25 To begin: 16 + 10 = 26 Then: 26 − 1 = 25
Finding the difference: 10 − 6 = 4 David has 10 sweets, whilst Chloe has six sweets. How many more does David have than Chloe?	**Reordering:** 8 + 7 + 2 = 17 e.g. calculating numbers in a different order To begin: 8 + 2 = 10 Then: 10 + 7 = 17	
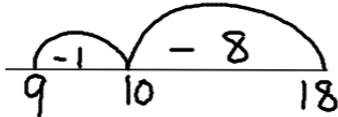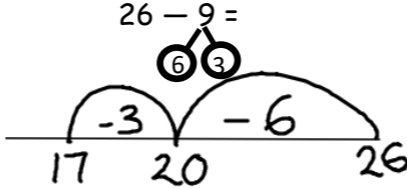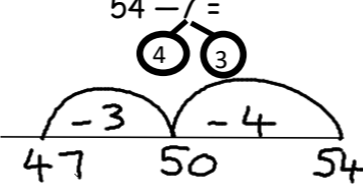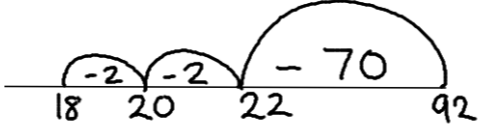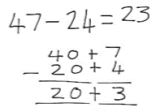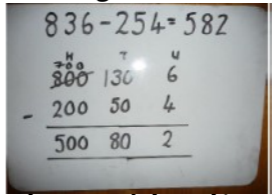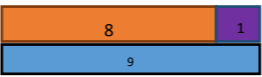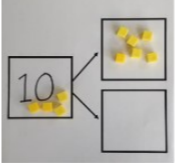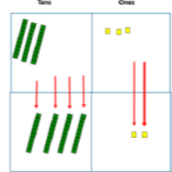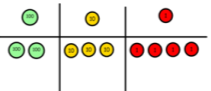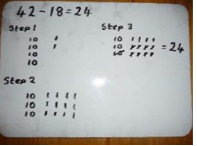
Doubling and halving: Double six is 12... Double five is ten... Double 16 can be calculated by working out... Double ten → 20 Double six → 12 With links to finding four-times a given value and finding a quarter of a value.	**Knowing multiplication and division facts to 12 X 12:** Arrays: 4 X 3 and 3 X 4 Number lines: 4 X 3 3 X 4 Scaling: Three times longer	**Multiplying a teen number by one-digit number:** X 2 10 3
Multiplying and dividing by multiples of ten: 20 X 10 = 200 Hundreds / Tens 2 / Ones 0 'Add a place value holder'	**Identifying fractions, decimals and percentages:**	Milk the maths... ...by allowing children to make connections between number facts.
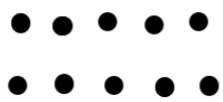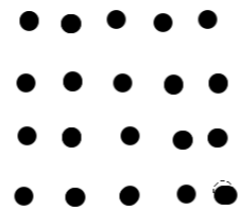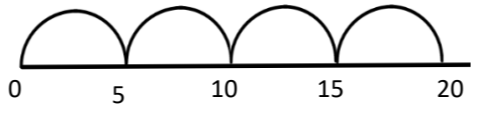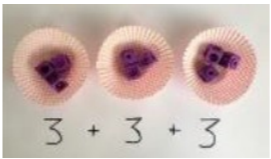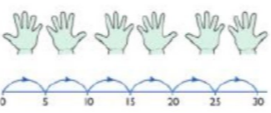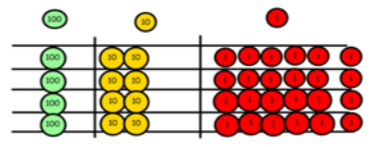
Addition

	Year 1	Year 2	Year 3	Year 4
Year Group Objectives	◆ given a number, identify one more. ◆ Read, write and interpret mathematical statements involving addition (+) and equals (=) ◆ Add one-digit and two-digit numbers within 20, including 0 ◆ Represent and use number bonds within 20. ◆ Solve missing number problems e.g. 10 + ___ = 16	◆ Add numbers using concrete objects and pictorial representations and mentally, including; • A two-digit number add 1s • A two-digit number add 10s • 2 two-digit numbers • 3 one-digit numbers ◆ Show that addition of two numbers can be done in any order. ◆ Recognise and use the inverse relationship between + and -.	◆ Add numbers with _up to three digits_, using formal written method of columnar addition ◆ Add numbers mentally, including; A three-digit number add 1s, A three-digit number add 10s, three-digit number and 100s. ◆ Estimate the answer to a calculation and use inverse to check. ◆ Solve problems, including missing number problem, using number facts, place value and more complex addition.	◆ Add numbers with _up to 4 digits_ using the formal written method of columnar addition. ◆ Estimate and use invese operations to check answers to a calculation. ◆ Solve addition two step problems in context.
Teaching Sequence	• Counting on– practical (including the use of Numicon) • Mentally recalling all addition number facts to 10 E.g. 5 + 4 = 9 • Mentally recalling all addition number facts to 20 E.g. 5 + 4 = 9 so 15 + 4 = 19 • Partitioning on a blank numberline (finding the 10) 8 + 7 = 15	• Partitioning on a blank numberline, bridging 20. 17 + 7 = 24 • Partitioning on a blank numberline, bridging any tens 46 + 9 • Mentally adding multiples of 10 3 + 3 = 6 so 30 + 30 = 60 • Partitioning 43 + 25 40 + 3 + 20 + 5 60 + 8 = 68	• Formal column addition 63 + 32 95 563 + 1 14 677 • Formal column addition carrying tens. 858 + 221 806 1	• Revisit adding up to 3 digits. • Formal column addition-4 digits 1845 + 1526 3371 1 1
Concrete / Pictorial support	• Part, part whole model (Use cubes / Numicon to support at start) Bead strings • Number frames (use cubes or counters—good for bridging ten) 8 1 9 8 + 1 = 9 9-1=8 1 + 8 = 9 9-8=1 • Bar model • Double sided counters	• Part, part whole model with greater numbers 46 26 20 • Bar mode with greater numbers • Cuisenaire 8+5 • Use of dienes and place value counters T O	• Part, part whole model with greater numbers • Bar model with greater numbers • Cuisenaire (can link to fractions)	Make both numbers on a place value grid. 146 + 527 • Place value counters to support column Add up the units and exchange 10 ones for one 10. 146 + 527
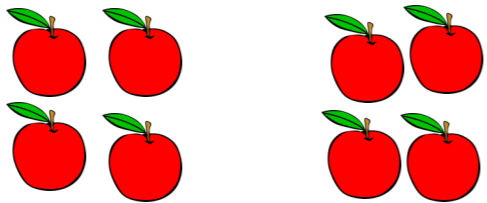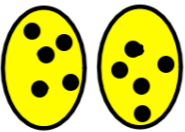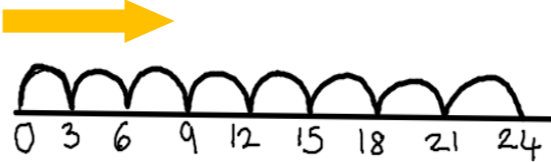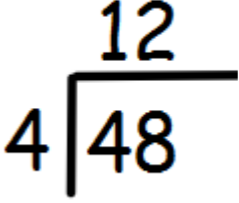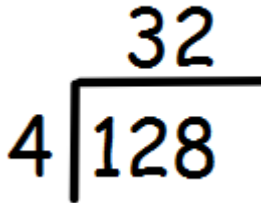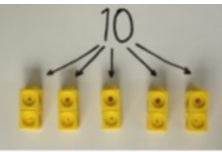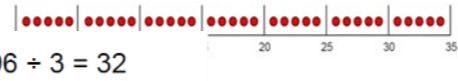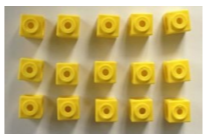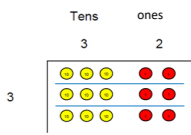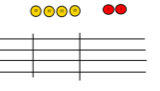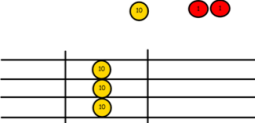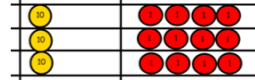
Subtraction

	Year 1	Year 2	Year 3	Year 4
Year Group Objectives	◆ Given a number identify one less. ◆ Read, write and interpret mathematical statements involving subtraction (-) and equals (=) ◆ Subtract one-digit and two-digit numbers within 20, including 0 ◆ Solve missing number problems e.g. 20— ___ = 16	◆ Subtract numbers using concrete objects and pictorial representations and mentally, including; • A two-digit number subtract 1s • A two-digit number subtract 10s • 2 two-digit numbers ◆ Recall and use subtraction facts to 20 fluently and use related facts up to 100.	◆ Subtract numbers with up to three digits, using formal written method of columnar subtraction ◆ Subtract numbers mentally, including; A three-digit number add 1s, A three-digit number add 10s, three-digit number and 100s. ◆ Estimate the answer to a calculation and use inverse to check.	◆ Subtract numbers with up to 4 digits using the formal written method of columnar subtraction ◆ Estimate and use inverse operations to check answers. ◆ Solve two-step problems, deciding which operations and methods to use and why.
Teaching Sequence	• Taking away– practical 9- 5 = 4 • Mentally recalling subtraction number facts to 10 E.g 7—5 = 2 • Mentally recalling subtraction number facts to 20 E.g. 9—3 = 6 so 19—3 = 16 • Partitioning on a blank numberline (finding the 10) 18-9 = 9	• Bridging 20 on a blank numberline 26 — 9 = • Bridging any tens number on a blank numberline 54 —7 = • Mentally subtracting multiples of 10 7 - 4 = 3 so 70 - 30=40 • Partitioning on a blank numberline 92-74= 18	• Partitioning 47-24 = 23 • Partitioning with exchange 836-254= 582 • Formal column subtraction– without exchange 148 - 31 117 • Formal column subtraction– with exchange 174 - 26 148	• Formal column subtraction—3 digits 467 - 173 294 • Formal column subtraction—4 digits 4387 - 2459 1928
Concrete / Pictorial support	• Bead strings • Cross out drawn objects to show what has been taken away. 15 – 3 = 12 • Cubes and tens frame e.g. Make 14 on the ten frame. Take away the four first to make 10 and then take away one more so you have taken away 5. You are left with the answer of 9.	• Bar model 8 + 1 = 9 9-1=8 1 + 8 = 9 9-8=1 • Part, part whole model (Use cubes / Numicon to support at start)	Use diennes to make the bigger number then take the smaller number away. Use place value counters to show how you partition numbers to subtract. Again make the larger number first. Take away the amount needed. If regrouping, swap hundreds for tens & tens for ones. Calculations 234 - 88	

Multiplication

	Year 1	Year 2	Year 3	Year 4
Year Group Objectives	◆ Solve one step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher ◆ Count in multiples of twos, fives and tens	◆ Recall and use multiplication facts for the 2, 5 and 10 multiplication tables ◆ Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (x) and equals (=) signs ◆ Solve problems involving multiplication using materials, arrays, repeated addition, mental methods and multiplication facts ◆ Show that multiplication of two numbers can be done in any order	◆ Recall and use multiplication facts for the 3, 4 and 8 multiplication tables ◆ Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental methods and progressing to a formal written method	◆ Multiply two-digit and three-digit numbers by using formal written layout ◆ Recall multiplication factions up to 12x12 ◆ Recognise and use factor pairs in mental calculations.
Teaching Sequence	• **Practical problems** "There are 4 pairs of socks. How many socks altogether?" • **Grouping** "5 groups of 2" • **Arrays** 2 x 5 = 	• **Arrays** 4 x 5 = Supported with repeated addition: "5+5+5+5" • **Blank numberline-** 4x 5 = 	• **Grid method** 13 x 5 = | ×	10	3
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5	50	15	 50 + 15 =65 • **Formal column multiplication** $$\begin{array}{r} 13 \\ \times\ 8 \\ \hline 104 \\ \hline {\scriptstyle 2} \end{array}$$	• **Formal column multiplication** $$\begin{array}{r} 324 \\ \times\ \ \ 4 \\ \hline 1292 \\ \hline \end{array}$$
Concrete / Pictorial support	Bead strings 4 lots of 5 Count in multiples supported by concrete objects (cubes, Numicon etc.) in equal groups. Create arrays using counters/cubes to show multiplication sentences	Use different objects to add equal groups. 3 + 3 + 3 Use a number line or pictures to continue support in counting in multiples	Use Diennes to move towards a more compact method Calculations 4 x 126	Use place value counters to show how you find groups of a number. We are multiplying by 4 so we need 4 rows etc

Division

	Year 1	Year 2	Year 3	Year 4
Year Group Objectives	◆ *Solve one step problems involving division by calculating the answer using concrete objects and pictorial representations*	◆ *Recall and use division facts for the 2, 5 and 10 multiplication tables* ◆ *Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs* ◆ *Solve problems involving division using materials, arrays, repeated subtraction, mental methods and division facts, including problems in context*	◆ *Recall and use division facts for the 3, 4 and 8 multiplication tables* ◆ *Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one-digit numbers, using mental methods and progressing to a formal written method*	◆ *Recall division facts from multiplication tables up to 12 x 12* ◆ *Use place value, known and derived facts to divide mentally*
Teaching Sequence	• **Sharing– practical** "Share these 8 apples equally between 2 children. How many apples will each child have?" • **Sharing– written** "Share 10 between two" 	• **Grouping using array** 15 ÷ 5 = • **Numberline—counting on** 24÷3= How many 3s in 24" 	• **Formal written method** 	• **Formal written method** 128 ÷ 4 =
Concrete / Pictorial support		 Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding. 96 ÷ 3 = 32 Link division to multiplication by creating an array and thinking about the number sentences that can be created.	Use place value counters to divide using the bus stop method alongside 42 ÷ 3= Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over. We exchange this ten for ten ones equally among the groups. We look how much in 1 group so the answer is 14.	

Year 5

Addition	Subtraction
♦ Add whole numbers with more than four digits, including using formal written methods	♦ Subtract whole numbers with more than four digits, including using formal written methods

• Formal Column Addition– 5 digits $\begin{array}{r} 21848 \\ +\ \ 1523 \\ \hline 23371 \\ \hline \end{array}$ ₁ ₁ • Formal with decimals $\begin{array}{r} 154.75 \\ +\ 233.82 \\ \hline 388.57 \\ \hline \end{array}$ ₁	• Formal Column Subtraction– 5 digits $\begin{array}{r} 47593 \\ -\ 24132 \\ \hline 23461 \\ \hline \end{array}$ • Formal Column Subtraction– with decimals $\begin{array}{r} 166.25 \\ -\ 83.72 \\ \hline 82.53 \\ \hline \end{array}$

Multiplication	Division
♦ Multiply numbers with up to four digits by a one-digit or two-digit number using the formal written method, including long multiplication for two-digit numbers	♦ Divide numbers up to four digits by one-digit numbers using the formal written method of short division and interpret remainders appropriately for the context

• Grid method 	×	20	3	 	10	200	30	 	3	60	9	 260 + 39 = 299 • Formal written $\begin{array}{r} 23 \\ \times\ 13 \\ \hline 69 \\ 230 \\ \hline 299 \\ \hline \end{array}$	• Formal written division $\begin{array}{r} 23 \\ 8\overline{)18\,^2 4} \end{array}$ • Formal written division remainders $\begin{array}{r} 86\,r2 \\ 5\overline{)43\,^3 2} \end{array}$