Calculation Policy

For I know the plans I have for you, plans to prosper you and not to harm you, plans to give you hope and a future. Jeremiah 29:11

Date of policy/review	Author	Approved by	Date for review
Sept 2021	B Hill	Mrs Bottell	Dec 2023

Mission Statement of Nutgrove Methodist Primary School

Nutgrove Methodist Primary School strives to provide a caring environment in which every individual can achieve his or her full potential, without limits.

This is encompassed by our Bible verse For I know the plans I have for you," declares the Lord, "plans to prosper you and not to harm you, plans to give you hope and a future. Jeremiah 29:11.

To achieve this, we wish to create a happy, secure and purposeful culture throughout the school, which is conducive to learning and high standards, and is based on our Christian values, love, hope and respect.

Our school's motto and vision is 'My Best, Always, Everywhere' which is interwoven within our curriculum intent and design.
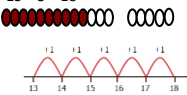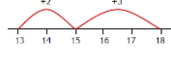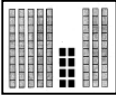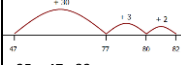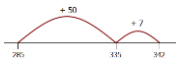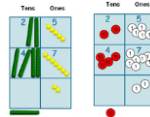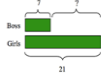
Safeguarding Statement

At Nutgrove Methodist Primary School we recognise our moral and statutory responsibility to safeguard and promote the welfare of all children.
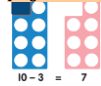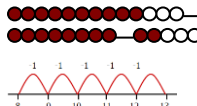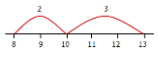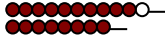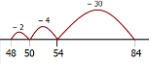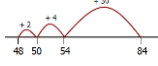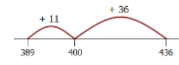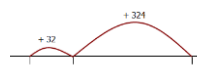
We work to provide a safe and welcoming environment where children are respected and valued. We are alert to the signs of abuse and neglect and follow our procedures to ensure that children receive effective support, protection and justice.

The procedures contained in the Child Protection and Safeguarding Policy apply to all staff, volunteers and governors.
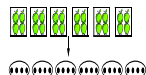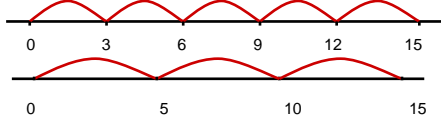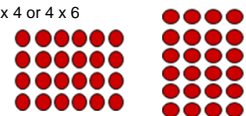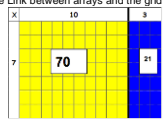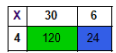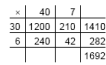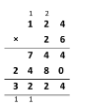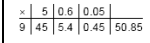
Addition

YR	Count … from 1-20 … and say which no. is 1 more than a given no. Using quantities objects, + two ones nos and count on to find the answer. [Expected] Estimate no. of objects; check quantities by counting up to 20. [Exceeding]	Practical or recorded using ICT. Hannah … listed how many girls and how many boys were outside. [She] was able to say that "There are 5 girls and 4 boys. That's 9 altogether". When playing in the shop Christopher used his shopping list to add 2 amounts. He said "the beans are 5 pence and the bananas are 3 pence, altogether that is 8 pence." Counting out loud and 1:1 correspondence (knowing that each object is a separate object	Dominoes, dice, counters Pictures/Objects I eat 2 cakes and my friend eats 3. How many cakes did we eat altogether?	Might be recorded as:	Symbolic 8 people are on the bus. 5 more get on at the next stop. How many people are on the bus now [Might be recorded as: *8 + 5 = 13*]			

Y1	Add (and subtract) one-digit and two-digit numbers to 20 (9 + 9, 18 - 9), including zero Read/write/interpret statements involving addition (+), subtraction (-) and equals (=) signs.	Pupils use concrete objects and pictorial representations (eg dienes, double sided counters, number lines,) *Problems should include terms:, add, altogether, total, take away, distance between, more than and less than, so pupils develop concept of +/- and use operations flexibly.*	Practical Pictures/Symbolic (*see Yr R*)	Visual (modelled using a range of counters) 13 + 5 = 18	Visual (efficient jumps) 13 + 5 = 18 [jumps may be in 1s]	Use known facts/partitioning 8 + 5 + 13 8 + 2 = 10 10 + 3 = 13 Breaking up numbers	

Y2	**TU + O** **TO + tens** **TO + TO** **O + O + O** [Show addition of two numbers can be done in any order.]	Recognise/use inverse relationship between +/- and use to check calcs and missing number problems. Pupils use concrete objects, pictorial representations and **mental strategies**. (eg dienes, 100 square, abacus,)	Practical/visual images 58 + 30 = 88	Visual (efficient jumps) Use alongside dienes 35 + 47= 82 [Also jumps can be in 10s and 1s]	No number line 35 + 47 = 82 47 + 30 = 77 77 + 3 = 80 80 + 2 = 82	Partitioning 35 + 47 = 82 40 + 30 = 70 7 + 5 = 12 Estimate answers and use inverse to check.	grouping tens Bar Model then ones 23+21 = 40+4	

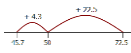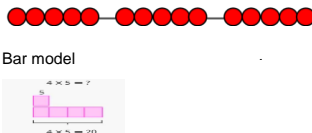|							
Y3	Use **formal** written methods of **columnar addition**. **TO + TO** **HTO + TO** **HTO + HTO**	Place value counters, dienes Number line 57 + 285 = 342 Use alongside dienes as needed	No number line 57 + 285 = 342 285 + 50 = 335 335 + 7 = 342	grouping 56+33 = 80+9 Bar model (see Y2)	Vertical expansion method using base ten and place value counters	**Compact** vertical Use alongside place value counters 374 + 248 622	Estimate answers and use inverse to check.

Y4	Use **formal** written methods of **columnar addition**. **HTO + HTO** **ThHTO + HTO** **ThHTO + ThHTO**	Estimate and use inverse operations to check answers to a calculation. Estimate, compare and calculate different measures, including money in pounds and pence.	grouping 132+121=100+50+3	789 + 642 = 1431 7 8 9 + 6 4 2 1 4 3 1 1 1	Place value counters 5735 + 562 = 6297 5735 + 562 6297	Solve addition two-step problems in contexts, deciding which operations and methods to use & why. Solve simple measure and money problems involving fractions and decimals to 2dp

Y5	Add whole numbers >4 digits, including using **formal** written methods (**columnar addition**). Decimals up to 2dp (eg 72.5 + 45.7)	Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. Solve addition multi-step problems in contexts, deciding which operations and methods to use and why.	**Solve problems involving number up to 3dp.** **Solve problems involving converting between units of time. [*Measurement*]** **Use all four operations to solve problems involving measure [eg length, mass, volume, money] using decimal notation including scaling. [*Measurement*]**	grouping 234+223=400+50+7 Bar model	**Compact** vertical 23.70 + 48.56 72.26 1 1 Place value counters	Pupils practise adding decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1. **Compact** vertical Using place value counters. 3.243 + 18.070 21.313 1 1

Y6	Solve multi-step problems in contexts, deciding which operations/methods to use and why. Decimals up to 3dp (Context: Measures)	Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.	Use knowledge of the order of operations to carry out calculations involving subtraction.	**Solve problems which require answers to be rounded to specified degrees of accuracy. [*Fractions*]** **Solve problems involving the calculation and conversion of units of measure, using decimal notation to 3dp where appropriate. [*Measurement*]**		**Compact** vertical using place value counters 3.243 + 18.070 21.313 1 1
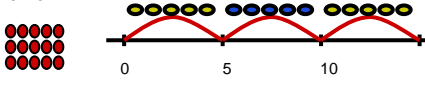
Subtraction

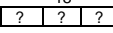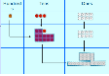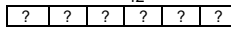|							
YR	Count … from 1-20 … and say which no. is 1 less than a given no. Using quantities objects, subtract two U nos and count back to find the answer. [Expected] Estimate no. of objects; check quantities by counting up to 20. [Exceeding]	Practical or recorded using ICT. Chloe was playing in the maths area. "I need three more" she said as she added some cubes to the circle. She then realised she had more than her friend. "Oh, I have too many". She removed one. "Now we have the same". During a game of skittles outdoors Joseph knocked three numbered skittles down. He was able to calculate his score in his head. [EYFS Profile exemplifications, STA]	Pictures/Objects Dominoes, dice, counters I have five cakes. I eat two of them. How many do I have left? Could be written as 5- 2 =3		Symbolic Mum baked 9 biscuits. I ate 5. How many were left? [Might be recorded as: 9 – 5 = 4]		
Y1	Subtract (and add) one-digit and two-digit numbers to 20 (9 + 9, 18 - 9), including zero Read/write/interpret statements involving addition (+), subtraction (-) and equals (=) signs	Practical or recorded using ICT. **Pupils use concrete objects and pictorial representations** (eg place value counters, Dienes, counters)	**Taking away** – jumps of 1 (modelled using bead strings) 13 – 5 =8 No number line: 13 – 3 = 10 10 – 2 = 8	Taking away **(efficient jumps) 13 – 5 = 8**	**Counting on** jumps of 1 (modelled using bead strings) 11 – 8 = 3	the difference between 8 – 5 = 3	**Counting on** (efficient jumps) With, or without, number line 8 + 2 = 10 10 + 1 = 11
Y2	**TO - O** **TO - tens** **TO - TO** [Show subtraction of two numbers <u>cannot</u> be done in any order.]	Recognise/use relationship betw. +/- to check calcs and missing number problems. Pupils use concrete objects and pictorial representations and **mental strategies** (eg place value counters, Dienes)	Practical/visual images 95 - 60 = 35	Taking away 84 - 36 = 48 [Also jumps can be in 10s/1s]	**Taking away** (no number line) 84 - 36 = 48 84 - 30 = 54 54 - 4 = 50 50 - 2 = 48 Use arrow cards	**Find the Difference** 84 - 48 = 36 [Also jumps can be in 10s/1s]	*Recording subtraction in columns supports place value and prepares for formal written methods with larger numbers.* 98 - 35 = 63
Y3	Use **formal** written methods of **columnar addition** **TO - TO** **HTO – TO** **HTO - HTO**	Dienes, place value counters **Counting on** 436 - 389 = 47	**Taking away** (no number line) 326 - 178 = 148 326 - 100 = 226 226 - 70 = 156 156 - 6 = 150 150 - 2 = 148	8 7 4 – 5 2 3 3 5 1 No decomposition	Oral and practical **Decomposition** 723 - 458 = 265	**Decomposition** 932 - 457 = 475	Estimate answers and use inverse to check. Bar Model
Y4	Use **formal** written methods of **columnar subtraction**. **HTO - HTO** **ThHTO - TO** **ThHTO - HTO** **ThHTO - ThHTO**	Dienes, place value counters, **Counting on** 1324 - 968 = 356	**Decomposition** 1374 – 968 = 406		Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why. Solve simple measure and money problems involving fractions and decimals to 2dp.	Estimate and use inverse operations to check. Estimate, compare and calculate different measures, including money in pounds and pence. Bar Model	
Y5	Subtract whole numbers >4 digits, including using **formal** methods (**columnar subtraction**). Decimals up to 2dp (eg 72.5 - 45.7)	Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. Solve multi-step problems in contexts, deciding which operations/methods to use and why.	Solve problems involving number up to 3dp. [*Fractions*] Solve problems involving converting betw. units of time. [*Measurement*] Solve problems involving measure [eg length, mass, volume, money] using decimal notation including scaling. [*Measurement*]	Dienes, place value counters **Counting on** 72.5 – 45.7 = 26.8	**Taking away** (no number line) 72.5 – 45.7 72.5 – 40 = 32.5 32.5 – 5 = 27.5 27.5 – 0.7 = 26.8	*Decomposition* 72.5 - 45.7 = 26.8	*Pupils practise subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1.* Bar Model
Y6	Solve multi-step problems in contexts, deciding which operations/methods to use and why. Decimals up to 3dp (Context: Measures)	Use knowledge of the order of operations to carry out calculations involving subtraction. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. Dienes, place value counters	Solve problems which require answers to be rounded to specified degrees of accuracy. [*Fractions*] Solve problems involving the calculation and conversion of units of measure, using decimal notation to 3dp where appropriate. [*Measurement*]	**There was 2.5 litres in the jug. Stuart drank 385 ml. How much was left?** 18.07 km - 3.243 km **Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.** **Bar Model**	*Decomposition* 72.5 - 45.7 = 26.8		

Multiplication

Year	Objective					
YR	Children … solve problems, including doubling, halving and sharing. [Expected] Solve practical problems that involve combining groups of 2/5/10. [Exceeding]	Practical/ recorded using ICT (eg digital photos / pictures on IWB) How many 10p coins are here? How much money is that? This domino is a double 4. How many spots does it have?		Pictures/Objects How many socks in three pairs?		Symbolic 3 pairs, 2 socks in each pair:
Y1	Solve one-step problems using concrete objects, pictorial representations and arrays *(with the support of the teacher)*	Practical/recorded using ICT Pictures/Symbolic There are five cakes in each bag. How many cakes are there in three bags?	Double sided counters Using number line to solve repeated addition problems by laying pieces upon track.	Visual (eg modelled using a range of counters) 5 x 3 or 3 x 5 [two, three times] or [three groups of two] Bar model		Arrays 5 x 2 or 2 x 5
Y2	Calculate statements for multiplication within the multiplication tables and write them using the multiplication and equals signs. [Show multiplication of two numbers can be done in any order.]	Pictures/Symbolic There are four apples in each box. How many apples in six boxes	Pupils use a variety of language to describe multiplication. Bar model	Repeated addition 5 x 3 or 3 x 5	0 3 6 9 12 15 / 0 5 10 15 Double sided counters	Arrays Real life arrays e.g. egg boxes 6 x 4 or 4 x 6
Y3	Write/calculate statements using the multiplication tables that they know (progressing to **formal** written methods). **TO x O** (multiplier is 2/3/4/5/8/10)	Make the Link between arrays and the grid method. Explicit x 10 3 / 7 70 21	36 x 4 = 144 X 30 6 / 4 120 24	36 x 4 = 144 30 x 4 = 120 6 x 4 = 24	36 x 4 = 144 36 x 4 144	Pupils develop reliable written methods for multiplication, starting with calculations of TU by U (progressing to formal written methods of short multiplication).
Y4	Use **formal** written layout: **TO x O HTOx O** Convert between different units of measure [eg km to m; hr to mi]	43 x 6 = 258 (estimate: 40 x 6 = 240) 40 x 6 = 240 3 x 6 = 18 Bar model		24 x 6 = 144 2 4 × 6 1 4 4		342 x 7 = 2394 3 4 2 × 7 2 3 9 4
Y5	Use a **formal** written method (including long x for TO nos) **TO x TO HTO x O / HTO x TO ThHTO x O** Convert between units of measure (eg km/m; m/cm; cm/mm; kg/g; litre and ml)	47 x 36 = 1692 (estimate 50 x 40 = 2000) × 40 7 / 30 1200 210 1410 / 6 240 42 282 / 1692 Bar model	Partition into 2 short multiplication sums as an interim step.	2741 x 6 = 16446 (estimate 3000 x 6 = 18000) 2 7 4 1 × 6 1 6 4 4 6	24 x 16 = 384 (estimate 25 x 15 = 375) 2 4 × 1 6 2 4 0 1 4 4 3 8 4	124 x 26 = 3224 [see Y6] 1 2 4 × 2 6 2 4 8 0 7 4 4 3 2 2 4	Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division. This relates to scaling by simple fractions, including those > 1. Find fractions of numbers and quantities, writing remainders as a fraction.
Y6	Multi-digit numbers (up to 4 digits) x TO whole number using the **formal** method of **long multiplication**. Multiply one-digit numbers with up to two decimal places by whole numbers	0·5 0·5 0·5 Apply knowledge of patterns to variations of	124 x 26 = 3224 1 2 4 × 2 6 7 4 4 2 4 8 0 3 2 2 4 [NB See Y5 method]	4.7 x 8 = 37.6 (estimate 5 x 8 = 40) [Or 47 x 8, then divide the solution by 10.] 4.7 × 8 37.6	5.65 x 9 = 50.85 (estimate 6 x 9 = 54) × 5 0.6 0.05 9 45 5.4 0.45 50.85 [Or compute 565 x 9, then divide the solution by 100.]	Use a variety of images to support understanding of x with fractions. Use understanding of relationship between unit fractions and ÷ to work backwards by x a quantity that represents a unit fraction to find the whole quantity (eg if ¼ of a length is 36cm,whole length 36 x 4 = 144cm). x numbers with up to 2dp by U/TU whole nos (starting with simplest cases eg 0.4 x 2 = 0.8, and in practical contexts).

Division

YR	Children … solve problems, including doubling, halving and sharing. [Expected] **They solve practical problems that involve sharing into equal groups. [Exceeding]**	Practical / recorded using ICT (eg digital photos/pictures on IWB) Sharing should only be used briefly as a precursor to grouping, which is a more preferable method and should be moved on to as soon as possible. Solving division by grouping strengthens mental calculation strategies.	Pictures/Objects 6 cakes shared between 2 6 cakes put into groups of 2	Symbolic 6 cakes shared between 2	There are 8 raisins. Take half of them. How many do you have? Share the 10 grapes between 2 people.
Y1	Solve one-step problems using concrete objects, pictorial representations and arrays *(with the support of the teacher)*	Practical/recorded using ICT There are 14 people on the bus. Half of them get off. How many remain on the bus? There are 20 people in the class. One quarter are boys. How many boys are there?	Pictures/Symbolic How many apples in each bowl if I share 12 apples between 3 bowls?	Visual (modelled using bead strings) $15 \div 5 = 3$ 15 0 5 10 *Double sided counters*	
Y2	Calculate statements within the multiplication tables and write them using the division and equals signs. Show division of two numbers <u>cannot</u> be done in any order. Find ⅓, ¼, ⅔, ¾ of a length/objects/quantity. Write simple fractions eg ½ of 6 = 3	Pictures/Symbolic Four eggs fit in a box. How many boxes would you need to pack 20 eggs? *Double sided counters*	*Pupils use a variety of language to describe division.*	Visual (modelled using bead strings) $18 \div 3 = 6$ 0 3 6 9 12 15 18 Counting on or back.	Arrays Find ¼ of 24 $24 \div 4 = 6$	Partitioning $32 \div 2 = 16$ $20 \div 2 = 10$ $12 \div 2 = 6$
Y3	Write/calculate statements using the tables that they know (progressing to **formal** written methods). **TO ÷ O** (divisor is 2/3/4/5/8/10)	$96 \div 4 = 24$ 20 x 4 4 x 4 0 80 96	Multiples of the divisor $85 \div 5 = 17$ 10 x 5 = 50 7 x 5 = 35	Bar model 3 children shared 18 fish equally between them. How many do they each have? 18 ? ? ? *Double sided counters, cubes*	$51 \div 3$ $= 17$ $\dfrac{17}{3\,|\,51}$	*Pupils develop reliable written methods for division, starting with calculations of TU by U numbers (progressing to formal written methods of short division).*
Y4	*Pupils practise to become fluent in the **formal** written method of **short division** with exact answers [NS]* **TO ÷ O; HTO ÷ O**	Multiples of the divisor $98 \div 7 = 14$ 10 x 7 = 70 4 x 7 = 28	$98 \div 7 = 14$ 1 4 $7\,|\,9\,^2\,8$	$252 \div 7 = 36$ 30 x 7 = 210 6 x 7 = 42	Bar model 6 children shared 42 fish equally between them. How many do they each have? 42 ? ? ? ? ? ? *Double sided counters, cubes*	$252 \div 7 = 36$ $\dfrac{36}{7\,|\,252}$
Y5	Use the **formal** written method of **short division** (interpret remainders appropriately for the context). **HTO ÷ O** **ThHTO ÷ O** Convert between units of measure (eg km/m; m/cm; cm/mm; kg/g; litre and ml)	Bar model *Double sided counters, cubes*	Breaking up numbers $291 \div 3 = 97$ (estimate: $270 \div 3 = 90$) $3\,|\,290 + 1 = 3\,|\,270 + 21$ This is then shortened to: $3\,|\,2\,9\,^1 1$ 9 7	$432 \div 5 = 86$ r2 (estimate: $400 \div 5 = 80$) 8 6 r 2 $5\,|\,4\,3\,^3\,2$	$8520 \div 6 = 1420$ 1420 $6\,|\,8520$	*Pupils connect x by a fraction to using fractions as operators (fractions of), and to ÷. This relates to scaling by simple fractions, incl. those > 1. Find fractions of numbers and quantities, writing remainders as a fraction.*
<u>**Y6**</u>	Divide numbers (up to 4 digits) by TU whole number using the **formal** method of **short/long division** (interpret as approp. for the context).Use written division methods in cases where the and has up to 2dp.*[Divide numbers up to 2dp by O/TO whole numbers.]*	Bar model *Double sided counters, cubes*	$43.68 \div 7 = 6.24$ (estimate: $42 \div 7 = 6$) [Or compute $4368 \div 7$, then divide the solution by 100.] 6.24 $7\,|\,43.^16\,8$	$496 \div 11$ (estimate $500 \div 10 = 50$) 4 5 r1 $1\,1\,|\,4\,9\,^5\,6$ Answer: $45\frac{1}{11}$	$432 \div 15 = 28.8$ 2 8 · 8 $1\,5\,|\,4\,3\,2\cdot0$ 3 0 ↓ 1 3 2 1 2 0 ↓ 1 2 0 1 2 0 0	