St Michael's

Whole School Calculation Policy

Reception to Year 6

Bespoke progression of methods, representations and written calculation

Purpose of this policy

This policy gives staff a consistent whole-school approach to teaching calculation from Reception to Year 6. It is designed to make progression visible so that methods build year on year rather than being taught as isolated tricks.

Core principles for St Michael's

- Consistency: the same core representations are used across school, with new methods clearly linked to earlier methods.
- Conceptual understanding first: pupils should understand what the operation means before recording a compact written method.
- Concrete-pictorial-abstract: manipulatives, diagrams and abstract symbols are connected explicitly; they are not separate activities.
- Fluency with flexibility: pupils learn efficient procedures, key facts and when to choose mental, jottings or written methods.
- Mathematical talk: teachers model sentence stems and require pupils to explain, compare and justify calculation choices.
- Inclusion: pupils can return to prior representations whenever needed. Manipulatives are a thinking tool, not a low-ability resource.

How to use the method boxes

- Start with the meaning of the operation before teaching a procedure.
- Connect every abstract method to a concrete or pictorial representation.

- Use the agreed representations and stem sentences so pupils meet a coherent progression across year groups.
- Move to compact written methods only when pupils can explain the place value and structure behind the method.
- Use earlier representations for intervention, pre-teaching and SEND support without labelling them as lower ability methods.

Research and guidance base

This policy is adapted from the White Rose Education 2024 calculation policy and shaped by current evidence and national guidance. It is not a direct copy: methods have been simplified into school-agreed progression boxes for staff consistency.

- White Rose Education Calculation Policy 2024: Calculation policy, Primary schemes of learning, updated for September 2024.
- EEF Improving Mathematics in Early Years and Key Stage 1: Best-evidence recommendations for children aged 3 to 7.
- EEF Improving Mathematics in Key Stages 2 and 3: Evidence-informed recommendations for pupils aged 7 to 14.
- Department for Education Mathematics Guidance: KS1 and KS2: Non-statutory guidance showing how pupils build core concepts from Year 1 to Year 6.
- NCETM Primary Mastery Professional Development: Progression spines for Number, Addition and Subtraction; Multiplication and Division; Fractions.
- NCETM Five Big Ideas at Primary - Fluency: Fluency includes recall, procedural fluency and flexibility/adaptability.

Whole-school representation toolkit

Phase	Core representations used consistently
Reception/Year 1	Fingers, real objects, five-frames, ten-frames, bead strings, part-whole plates, number tracks, simple bar models.
Year 2	Ten-frames, part-whole models, bead strings, number lines, base-10, place value charts, arrays.
Year 3/4	Place value counters, base-10, bar models, number lines, arrays, grid/area model, fraction strips.
Year 5/6	Place value charts, bar models, double number lines, ratio tables, area models, fraction models, formal written methods.

At-a-glance progression by operation

These overview grids show the build-up of mental methods, models and written methods. The detailed method boxes that follow should be used when planning and when supporting consistency across year groups.

Addition progression overview				
Stage	**Mental methods**	**Concrete/pictorial**	**Written methods**	**Key language**
Reception	1 more; combine groups	Objects, fingers, five-/ten-frames	Oral/mark making	altogether, more, whole
Year 1	Add together; add more;	Part-whole, ten-frame, number	a + b = c	part, whole, plus, equal

	bonds	line		
Year 2	Bridge 10; add 1s/10s	Base-10, PV chart	Expanded then compact column	exchange, tens, ones
Year 3	Add 1s/10s/100s	PV counters, bar model	Column up to 3 digits	hundreds, complement
Year 4	Add 4-digit numbers	PV charts, fraction strips	Column incl. decimals/money	decimal, denominator
Year 5	Choose efficient methods	Number lines, bar models	Column, common denominators	complement, equivalent
Year 6	Integers, decimals, fractions	Bar, fraction and PV models	Efficient formal methods	order of operations

Subtraction progression overview

Stage	Mental methods	Concrete/pictorial	Written methods	Key language
Reception	Take away practically	Objects, fingers	Oral/mark making	left, take away
Year 1	Find a part; difference	Part-whole, number line	c - a = b	part, whole, difference
Year 2	Bridge 10; subtract 2 digits	Base-10, PV chart	Number line Method/Expanded then compact column	exchange, subtract
Year 3	Subtract 1s/10s/100s	PV counters, number line	Column up to 3 digits	complement, exchange
Year 4	Subtract 4-digit numbers	PV charts, fraction strips	Column incl. decimals/money	decimal, denominator
Year 5	Mental difference or column	Number lines, bar models	Column, common denominators	efficient, equivalent
Year 6	Integers, decimals, fractions	Number lines incl. negatives	Efficient formal methods	negative, operation

Multiplication progression overview

Stage	Mental methods	Concrete/pictorial	Written methods	Key language
Reception	Double; equal groups	Pairs, ten-frame, objects	Oral/mark making	double, groups
Year 1	Count 2s/5s/10s; arrays	Objects, arrays, bead strings	Repeated addition	equal groups, rows
Year 2	2, 5, 10 facts	Arrays, number lines	a x b = c	times, multiply
Year 3	3, 4, 8; partitioning	Arrays, area model	Expanded multiplication	product, scaling
Year 4	Facts to 12x12; short mult.	PV counters, area model	Short multiplication	factor pair
Year 5	Short/long multiplication	Area model, PV chart	Long multiplication	partial product
Year 6	Decimals, fractions, ratio	Bar/ratio/fraction models	Formal efficient methods	proportion, ratio

Division progression overview

Stage	Mental methods	Concrete/pictorial	Written methods	Key language
Reception	Share/group fairly	Objects, plates, bowls	Oral/mark making	share, equal
Year 1	Grouping/sharing; halves	Objects, arrays, folding	Repeated grouping marks	half, quarter
Year 2	Divide by 2, 5, 10	Arrays, grouping circles	a ÷ b = c	divide, inverse
Year 3	Divide by 3, 4, 8	PV counters, arrays	Partitioning jottings	remainder
Year 4	Facts to 12x12; exchange	PV counters, arrays	Short division intro	exchange
Year 5	Up to 4 digits ÷ 1 digit	PV chart, bar model	Short division	remainder as fraction
Year 6	Long division; decimals/fractions	Bar, PV, fraction models	Short/long division	quotient, ratio

Addition

Addition is taught as aggregation (combining parts) and augmentation (adding more). Pupils must understand the whole-part relationship before using column methods.

Addition: non-negotiables

- Teach the structure of the operation first, then the method.
- Use agreed models and stem sentences before abstract notation.
- Expect pupils to explain why the method works, not just complete the steps.
- Choose the most efficient method: mental, jottings or formal written calculation.

Reception
Addition

Numbers are composed of parts which can be combined to make a whole.

Method: Combine 2 groups and add more through stories, songs, fingers, objects and ten-frames.
Representation: Fingers, five-frame, ten-frame, part-whole plates, real-life collections.
Recording: Oral stem: "First... then... now..." and "... and ... make ...".
Watch for: Children counting the same object twice; missing the idea of one total.
Builds to: Year 1 aggregation, augmentation and number bonds within 10/20.

Year 1
Addition

Addition means combining parts or increasing a quantity.

Method: Add together, add more, use bonds within 10, related facts within 20 and missing numbers.
Representation: Part-whole model, ten-frame, bead string, number line, bar model introduction.
Recording: a + b = c; c = a + b; missing number equations such as 7 = __ + 2.
Watch for: Only reading equations left to right; confusing whole and part.
Builds to: Year 2 bridging 10 and adding two 2-digit numbers.

Year 2 **Addition**	**Known facts and place value are used to add efficiently.** **Method:** Add 1s/10s, add three 1-digit numbers, bridge ten and add 2-digit numbers with/without exchange. **Representation:** Base-10, place value chart, number line, part-whole model. **Recording:** Expanded column method leading to column addition; record exchanged ten where appropriate. **Watch for:** Adding digits without considering place value; exchange not linked to 10 ones = 1 ten. **Builds to:** Year 3 column addition up to 3 digits and complements to 100.
Year 3 **Addition**	**Mental strategies and formal written addition are connected through place value.** **Method:** Add 1s, 10s and 100s; add two numbers with and without exchange; use complements to 100. **Representation:** Place value counters, base-10, number lines, bar models for problems. **Recording:** Column addition for up to 3 digits; fractions with same denominator within one whole; duration jottings. **Watch for:** Lining up numbers incorrectly; exchanging without explaining the value. **Builds to:** Year 4 addition of 4-digit numbers, decimals/money and fractions beyond 1.
Year 4 **Addition**	**Column addition is applied to larger numbers, money and fractions.** **Method:** Add to 4-digit numbers; add decimal amounts in money; add fractions/mixed numbers with same denominator. **Representation:** Place value counters, place value charts, bar models, fraction strips. **Recording:** Compact column addition; decimals aligned by place value; fractions recorded with common denominator. **Watch for:** Misaligning decimals; adding denominators when adding fractions. **Builds to:** Year 5 larger numbers, decimals to 2 d.p. and related-denominator fractions.

Year 5 **Addition**	**Efficient written and mental methods are selected for the calculation.** **Method:** Add whole numbers beyond 4 digits; decimals to 2 places; complements to 1; related-denominator fractions. **Representation:** Place value charts, number lines for complements, bar models, fraction strips. **Recording:** Column addition for integers/decimals; fraction addition by converting to common denominators where needed. **Watch for:** Using column methods when mental methods are more efficient; inconsistent decimal alignment. **Builds to:** Year 6 integers to 10 million, decimals to 3 d.p., fractions and order of operations.
Year 6 **Addition**	**Addition is applied flexibly across integers, decimals, fractions and negative numbers.** **Method:** Add integers to 10 million, decimals to 3 places, fractions and calculations involving order of operations. **Representation:** Place value charts, double number lines, bar models, fraction models. **Recording:** Compact written methods; common-denominator fraction methods; brackets/order of operations notation. **Watch for:** Ignoring order of operations; adding unlike fractions without equivalent denominators. **Builds to:** KS3 efficient arithmetic with directed numbers, decimals and fractions.

Subtraction

Subtraction is taught through three related structures: finding a part, taking away and finding the difference. Pupils should meet all three structures across school.

Subtraction: non-negotiables

- Teach the structure of the operation first, then the method.
- Use agreed models and stem sentences before abstract notation.
- Expect pupils to explain why the method works, not just complete the steps.
- Choose the most efficient method: mental, jottings or formal written calculation.

Reception
Subtraction

A whole can be reduced or split into parts.

Method: Take away through stories, songs, objects and practical contexts; compare what is left.
Representation: Real objects, fingers, five-frames, part-whole plates.
Recording: Oral stem: "First... then... now..." and "... is left".
Watch for: Pupils may think subtraction always means physically taking away, not finding a missing part.
Builds to: Year 1 find a part, take away and difference.

Year 1
Subtraction

Subtraction means finding a part, taking away or finding the difference.

Method: Find a part, take away, use bonds within 10, related facts within 20 and missing numbers.
Representation: Part-whole model, ten-frame, bead string, number line, bar model.
Recording: c - a = b; missing number equations; number line jumps back or difference jumps.
Watch for: Confusing the whole with a part; always counting back when difference is more efficient.
Builds to: Year 2 subtracting across 10 and subtracting 2-digit numbers.

Year 2 **Subtraction**	**Subtraction uses known facts, place value and exchange.** **Method:** Subtract 1s/10s, subtract across 10, subtract multiples of 10 and 2-digit numbers. **Representation:** Base-10, place value counters, number line, part-whole model. **Recording:** Expanded column subtraction leading to compact column subtraction with exchange when secure. **Watch for:** Exchanging procedurally without understanding 1 ten = 10 ones. **Builds to:** Year 3 subtraction up to 3 digits and complements to 100.
Year 3 **Subtraction**	**Subtraction can be solved by take away, difference or inverse addition.** **Method:** Subtract 1s, 10s and 100s; subtract two numbers with/without exchange; complements to 100. **Representation:** Place value counters, number lines, bar models. **Recording:** Column subtraction up to 3 digits; fractions with same denominator within one whole. **Watch for:** Choosing inefficient counting back for close numbers; misalignment by place value. **Builds to:** Year 4 subtraction of 4-digit numbers, money/decimals and fractions.
Year 4 **Subtraction**	**Formal subtraction is applied to 4-digit numbers and measures.** **Method:** Subtract 1s, 10s, 100s and 1,000s; subtract 4-digit numbers; subtract decimals/money and fractions. **Representation:** Place value charts, counters, number lines for difference, bar models. **Recording:** Compact column subtraction; decimals aligned by place value; subtract fractions with same denominator. **Watch for:** Forgetting to exchange across zero; subtracting denominators. **Builds to:** Year 5 large numbers, decimals to 2 d.p. and complements to 1.

Year 5 **Subtraction**	**Pupils choose between mental difference and written subtraction.** **Method:** Subtract numbers beyond 4 digits, decimals to 2 places, complements to 1 and related-denominator fractions. **Representation:** Number lines, place value charts, bar models, fraction strips. **Recording:** Compact column subtraction; common-denominator fraction subtraction. **Watch for:** Defaulting to formal method when counting on is easier; decimal misalignment. **Builds to:** Year 6 negative numbers, decimals to 3 d.p., fractions and order of operations.

Year 6 **Subtraction**	**Subtraction is applied flexibly across number systems.** **Method:** Subtract integers to 10 million, decimals to 3 places, fractions, negative numbers and order of operations. **Representation:** Number lines including negative values, bar models, fraction models. **Recording:** Formal methods for integers/decimals; common-denominator fraction methods; directed number notation. **Watch for:** Treating negative numbers as smaller without considering direction on a number line. **Builds to:** KS3 directed number arithmetic and algebraic manipulation.

Multiplication

Multiplication is taught as equal groups, repeated addition, arrays, scaling and correspondence. Written methods are grounded in place value and the area model.

Multiplication: non-negotiables

- Teach the structure of the operation first, then the method.
- Use agreed models and stem sentences before abstract notation.
- Expect pupils to explain why the method works, not just complete the steps.
- Choose the most efficient method: mental, jottings or formal written calculation.

Reception **Multiplication**	**Equal groups and doubles are the foundation for multiplication.** **Method:** Double to 10 and make equal groups during play, routines and practical contexts. **Representation:** Fingers, paired objects, ten-frames, everyday collections. **Recording:** Oral stem: "There are ... groups of ..." and "Double ... is ...". **Watch for:** Unequal groups being counted as equal groups. **Builds to:** Year 1 counting in 2s, 5s and 10s, arrays and doubles.

Year 1 **Multiplication**	**Multiplication begins as equal groups, repeated addition and arrays.** **Method:** Count in 2s, 5s and 10s; add equal groups; make arrays and doubles. **Representation:** Objects in groups, arrays, bead strings, number tracks. **Recording:** Repeated addition such as 2 + 2 + 2; early array language "rows" and "columns". **Watch for:** Counting objects one by one only; not noticing equal group structure. **Builds to:** Year 2 multiplication symbol and 2, 5 and 10 times-tables.

Year 2 **Multiplication**	**Repeated addition is connected to multiplication facts.** **Method:** Link repeated addition and multiplication; use arrays; double; learn 2, 5 and 10 times-tables. **Representation:** Arrays, bead strings, number lines, equal group diagrams. **Recording:** a x b = c; missing number equations; commutativity shown through arrays. **Watch for:** Thinking 3 x 5 and 5 x 3 look the same in context; mixing groups and group size. **Builds to:** Year 3 3, 4 and 8 times-tables and 2-digit by 1-digit multiplication.
Year 3 **Multiplication**	**Known facts are extended to larger products using partitioning.** **Method:** Learn 3, 4 and 8 facts; use related facts; multiply 2-digit numbers by 1-digit numbers. **Representation:** Arrays, place value counters, grid/area models. **Recording:** Partitioning and expanded multiplication before compact short multiplication. **Watch for:** Losing place value when multiplying tens; not linking 8x to double 4x. **Builds to:** Year 4 facts to 12 x 12 and 2/3-digit by 1-digit multiplication.
Year 4 **Multiplication**	**Multiplication facts and place value support efficient written multiplication.** **Method:** Recall facts to 12 x 12; multiply by 1/0; factor pairs; multiply by 10/100; multiply 2 or 3 digits by 1 digit. **Representation:** Arrays, factor-pair grids, place value charts, area model. **Recording:** Short multiplication for 2/3-digit by 1-digit after expanded methods are secure. **Watch for:** Appending zeros without understanding place value; carrying digits without meaning. **Builds to:** Year 5 long multiplication and multiplication by 10, 100 and 1,000.

Year 5 **Multiplication**	**Pupils move from short to long multiplication and apply scaling.** **Method:** Use multiples/factors, square/cube numbers; multiply up to 4 digits by 1 or 2 digits; multiply by 10/100/1,000. **Representation:** Area model, place value chart, factor trees, bar models. **Recording:** Short multiplication and long multiplication; record partial products clearly. **Watch for:** Misplacing partial products; treating x10/x100 as adding zeros for decimals. **Builds to:** Year 6 multiplication with decimals, fractions, ratio and order of operations.
Year 6 **Multiplication**	**Multiplication methods are selected and applied across contexts.** **Method:** Use long multiplication, multiply decimals by integers, multiply fractions by fractions and use ratio. **Representation:** Area model, double number line, bar model, fraction models. **Recording:** Long multiplication; decimal multiplication; fraction multiplication; ratio notation. **Watch for:** Decimal point placement without estimating; multiplying denominators/numerators without understanding the model. **Builds to:** KS3 proportional reasoning, algebraic expansion and efficient arithmetic.

Division

Division is taught as sharing, grouping and inverse multiplication. Pupils should understand remainders in context before recording them formally.

Division: non-negotiables

- Teach the structure of the operation first, then the method.
- Use agreed models and stem sentences before abstract notation.
- Expect pupils to explain why the method works, not just complete the steps.
- Choose the most efficient method: mental, jottings or formal written calculation.

Reception
Division

Fair sharing and grouping develop the idea of equal groups.

Method: Share items and make equal groups in play, routines and snack-time contexts.
Representation: Real objects, plates, bowls, counters, ten-frames.
Recording: Oral stem: "... shared equally between ..." and "There are ... groups of ...".
Watch for: Assuming any groups are fair/equal without checking.
Builds to: Year 1 grouping, sharing, halves and quarters.

Year 1
Division

Division is introduced as grouping, sharing and equal parts.

Method: Make equal groups by grouping and sharing; find halves and quarters of shapes and quantities.
Representation: Objects, arrays, folding shapes, bar model beginnings.
Recording: Repeated subtraction language; "half of ..." and "quarter of ...".
Watch for: Confusing number of groups with size of groups.
Builds to: Year 2 divide by 2, 5 and 10 and unit/non-unit fractions.

Year 2 **Division**	**Division facts connect to times-tables and arrays.** **Method:** Divide by 2, 5 and 10; solve missing numbers; identify unit and non-unit fractions. **Representation:** Arrays, grouping circles, number lines, bar models. **Recording:** a ÷ b = c; link to multiplication inverse; record remainders only practically if they occur. **Watch for:** Not linking division to multiplication; confusing unit and non-unit fractions. **Builds to:** Year 3 divide by 3, 4 and 8 and divide 2-digit by 1-digit numbers.
Year 3 **Division**	**Division uses related facts, partitioning and remainders.** **Method:** Divide by 3, 4 and 8; use related facts; divide 2-digit numbers by 1-digit numbers with/without remainders. **Representation:** Arrays, number lines, place value counters, part-whole model. **Recording:** Partitioning and flexible jottings before short division. **Watch for:** Ignoring the remainder; partitioning into non-useful parts. **Builds to:** Year 4 division facts to 12 x 12 and 2/3-digit by 1-digit division.
Year 4 **Division**	**Division facts and place value support short division.** **Method:** Recall division facts to 12 x 12; divide by 1 and itself; divide 2/3-digit numbers by 1 digit; divide by 10/100. **Representation:** Place value charts, counters, arrays, bar models. **Recording:** Short division introduced with place value counters and exchange. **Watch for:** Exchanging without understanding; moving digits instead of changing place value. **Builds to:** Year 5 divide numbers up to 4 digits and find fractions of amounts.

Year 5 **Division**	**Short division is extended and connected to fractions and decimals.** **Method:** Use mental strategies; divide up to 4 digits by 1 digit; divide by 10/100/1,000; find fractions of amounts. **Representation:** Place value charts, counters, bar models, fraction strips. **Recording:** Short division with remainders, fractions or decimals depending on context. **Watch for:** Remainder recorded without context; decimal division not aligned to place value. **Builds to:** Year 6 long division, decimals, percentages and ratio.

Year 6 **Division**	**Division is applied efficiently across integers, decimals, fractions and ratio.** **Method:** Use short and long division, divide decimals by integers, divide fractions by integers, calculate percentages and ratio. **Representation:** Bar models, double number lines, place value charts, fraction models. **Recording:** Short division, long division, decimal division, fraction division notation. **Watch for:** Choosing a written method without estimating; confusing fraction of amount with division by a fraction. **Builds to:** KS3 efficient arithmetic, proportional reasoning and algebraic fractions.

Fluency, recall and daily practice

Fluency at St Michael's means three connected things
• Recall and automaticity: pupils can recall key facts without heavy cognitive load. • Procedural fluency: pupils can carry out methods accurately and efficiently. • Flexibility and adaptability: pupils can choose a suitable method and apply it in different contexts.

Daily and weekly expectations

- EYFS/KS1: short daily counting, subitising, number bonds, doubles/halves and comparison routines.
- Lower KS2: daily arithmetic retrieval including number bonds, times-tables, complements, place value and mental strategies.
- Upper KS2: daily retrieval of arithmetic procedures, times-tables, fraction/decimal/percentage equivalence and efficient method choice.
- All classes: pupils explain at least one calculation using a representation, stem sentence or bar model each week.

Intervention and SEND support

- Intervention should return to the earliest insecure representation rather than repeating abstract calculations.
- Use the same school-agreed representations in intervention so pupils do not experience a separate curriculum.
- Pre-teach key vocabulary, stem sentences and manipulatives before the main calculation lesson.
- Record the representation used in intervention notes so the next adult can build from the same model.

Monitoring consistency

Monitoring area	What leaders should look for
Books	Check that representations match the agreed policy and that pupils progress from models to abstract recording.
Lessons	Look for explicit links between concrete, pictorial and abstract methods, and for stem sentences being used.
Pupil voice	Ask pupils to explain why a written method works and when a mental method might be more efficient.
Assessment	Identify whether errors are conceptual, procedural, language-based or linked to missing facts.

Appendix A: agreed calculation language

Operation	Vocabulary to use consistently
Addition	part, whole, add, plus, total, sum, altogether, increase, exchange, complement
Subtraction	subtract, take away, difference, less, fewer, decrease, exchange, missing part
Multiplication	equal groups, groups of, times, multiply, product, factor, multiple, scaling, array
Division	share, group, divide, quotient, remainder, equal parts, half, quarter, inverse

Appendix B: source list

- White Rose Education. Calculation policy: Primary schemes of learning. Updated for September 2024. https://assets.whiteroseeducation.com/new-schemes/WRM%20calculation%20policy%202024%20All%20year%20groups.pdf
- Education Endowment Foundation. Improving Mathematics in the Early Years and Key Stage 1. https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/early-maths
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- NCETM. Primary Mastery Professional Development materials. https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/primary-mastery-professional-development/
- NCETM. The Five Big Ideas at Primary - Fluency. https://www.ncetm.org.uk/features/the-five-big-ideas-at-primary-fluency/