Netherthorpe Primary School (updated December 2021)

**Maths Long Term Plan with Progression of Skills**

**Year 6**

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| **Autumn**  |
| **Knowledge** | 6AS/MD–1 Quantify additive and multiplicative relationships6AS/MD–2 Derive related calculations | Multiples of 1000 | 6NPV–1 Powers of 106NPV–2 Place value in numbers up to 10,000,0006NPV–3 Numbers up to 10 million in the linear number system6NPV–4 Reading scales with 2, 4, 5 or 10 intervals. | 6G–1 Draw, compose and decompose shapes |
| **Unit 1****Calculating using knowledge of structures** | **Unit 2****Multiples of 1000** | **Unit 3****Numbers up to 10, 000** | **Unit 4****Draw, compose and decompose shapes** |
| **Progression of Skills** | * Explain how a combination of different parts can be equivalent to the same whole and can represent this in an expression
* Identify structures within stories and use their knowledge of structures to create stories
* Identify the missing part using their knowledge of part whole relationships and structures
* Interpret and represent a part-whole problem with 3 addends using a model
* Create stories to correctly match a structure presented in a model
* Use their knowledge of additive structures to solve problems
* Calculate the value of a missing part (1)
* Calculate the value of a missing part (2)
* Correctly represent an equation in a part-whole model
* Explain how adjusting both addends affects the sum (2 digit numbers)
* Explain how adjusting both addends affects the sum (decimal fractions)
* Use the ‘same sum’ rule to balance equations
* Use the ‘same sum’ rule to balance equations with an unknown
* Explain how adjusting one addend affects the sum
* Solve addition calculations mentally by using known facts
* Solve calculations with missing addends
* Explain how adjusting both the minuend and subtrahend by the same amount affects the difference
* Explain how using the ‘same difference’ rule can make mental calculation easier (1)
* Explain how using the ‘same difference’ rule can make written calculation easier (2)
* Use the ‘same difference’ rule to balance equations
* Explain how increasing or decreasing the minuend affects the difference (1)
* Explain how increasing or decreasing the minuend affects the difference (2)
* Solve subtraction calculations mentally by using known facts
* Explain how adjusting the minuend can make mental calculation easier
* Explain how adjusting the subtrahend affects the difference
* Explain how increasing or decreasing the subtrahend affects the difference
* Calculate the difference using their knowledge of an adjusted subtrahend (1)
* Calculate the difference using their knowledge of an adjusted subtrahend (2)
 | * Explain how ten thousand can be composed
* Explain how one hundred thousand can be composed
* Read and write numbers up to one million (1)
* Read and write numbers up to one million (2)
* Identify and place the position of five-digit multiple of one thousand numbers, on a marked, but unlabelled number line
* Identify and place the position of six-digit multiple of one thousand numbers, on a marked, but unlabelled number line
* Count forwards and backwards in steps of powers of 10, from any multiple of 1,000
* Explain that 10,000 is composed of 5,000s 2,500s and 2,000s
* Explain that 100,000 is composed of 50,000s 25,000s and 20,000s
* Read scales in graphing and measures contexts, by using their knowledge of the composition of 10,000 and 100,000
 | * Use representations to identify and explain patterns in powers of 10
* Compose seven or eight-digit numbers using common intervals
* Use their knowledge of the composition of up to eight-digit numbers to solve problems
* Explain how to read numbers with up to seven digits efficiently
* Recognise and create numbers that contain place-holding zeroes
* Determine the value of digits in numbers up to tens of millions
* Explain how to compare up to eight-digit numbers
* Use their knowledge of the composition of seven-digit numbers to solve problems
* Add and subtract mentally without bridging a boundary (only one and more than one digit changes)
* Add numbers whilst crossing the millions boundary
* Subtract numbers whilst crossing the millions boundary (multiples of 100,000 and different powers of 10)
* Explain how a seven-digit number can be composed and decomposed into parts
* Identify and explain a pattern in a counting sequence
* Identify numbers with up to seven digits on marked number lines
* Estimate the value and position of numbers on unmarked or partially marked number lines
* Explain why we round and how to round seven-digit numbers to the nearest million
* Explain how to round seven-digit numbers to the nearest hundred thousand
* Explain how to round up to seven-digit numbers to any power of 10 in context
* Identify and explain the most efficient way to solve a calculation
* Add and subtract numbers with up to seven digits using column addition and subtraction
* Explore and explain different written and mental strategies to solving addition and subtraction problems
* Solve addition and subtraction problems and explain whether a mental or written strategy would be most efficient
 | * Draw, sketch and identify shapes using knowledge of shape properties.
* Compose the same 3D shape from different 2D nets.
* Decompose and rearrange 2D shapes so the area remains the same. The area of a compound shape is therefore equal to the total of the areas of the constituent parts
* Decompose parallelograms and rearrange the parts to form a rectangular parallelogram.
* Compose two congruent triangles to form a parallelogram.
* Investigate shapes with the same area to understand that they can have different perimeters. Shapes with the same perimeters can have different areas.
* Use the relationship between area and side length, and perimeter and side length, to reason about measurements of shapes, including compound shapes.
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|  | **Spring** |
| **Knowledge** | 6AS/MD–2 Derive related calculations | Area, Perimeter, position and direction. | 6F–1 Simplify fractions6F–2 Express fractions in a common denomination6F–3 Compare fractions with different denominators |
| **Unit 5****Multiplication and Division** | **Unit 6****Area, perimeter, position and direction.** | **Unit 7****Fractions and percentages** |
| **Progression of Skills** | * Explain why the product stays the same when one factor is doubled and the other is halved
* Explain the effect on the product when scaling the factors by the same amount
* Use their knowledge of equivalence when scaling factors to solve problems
* Explain the effect on the quotient when scaling the dividend and divisor by 10
* Explain the effect on the quotient when scaling the dividend and divisor by the same amount
* Explain how to multiply a three-digit by a two-digit number
* Explain how to accurately use the method of long multiplication to multiply two, two-digit numbers (no regrouping of ones to tens)
* Explain how to accurately use the method of long multiplication (with regrouping of ones to tens)
* Explain how to accurately use the method of long multiplication (with regrouping of ones to tens & tens to hundreds)
* Explain how to accurately use the method of long multiplication to multiply a three-digit by a two-digit number
* Explain how to accurately use the method of long multiplication to multiply a four-digit by a two-digit number
* Explain how to use the associative law to multiply efficiently
* Explain when it is more efficient to use long multiplication or factorising to multiply by two-digit numbers
* Explain how to use accurately the methods of short and long division (two and three-digit number by multiples of 10)
* Explain how to use accurately the method of long division with and without remainders (two-digit by two-digit numbers)
* Use knowledge of long division to solve problems in a range of contexts (with and without remainders)
* Explain how to use a ratio chart to solve efficiently: short division
* Explain how to use a ratio chart to solve efficiently: long division
* Explain how to use a ratio chart to solve efficiently: long division (II)
* Explain how to use accurately the method of long division with and without remainders (three-digit by two-digit, four-digit by two-digit numbers)
* Use long division with decimal remainders (1 decimal place)
* Use long division with fraction remainders
* Use long division with decimal remainders (2 decimal places)
* Use knowledge of the best way to interpret and represent remainders from a range of division contexts
* Explain how and why a product changes when a factor changes multiplicatively
* Use their knowledge of multiplicative change to solve problems efficiently (multiplication)
* Explain how and why a quotient changes when a dividend changes multiplicatively (increase or decrease)
* Explain how and why a quotient changes when a divisor changes multiplicatively
* Identify and explain the relationship between divisors and quotients
 | * Explain how to calculate the area of a parallelogram
* Explain how to calculate the area of a triangle
* Explain why shapes can have the same perimeters but different areas
* Explain why shapes can have the same areas but different perimeters
* Describe the relationship between scale factors and side lengths of two shapes
* Describe the relationship between scale factors and perimeters of two shapes
* Describe positions on the full coordinate grid (all four quadrants)
* Draw and translate simple shapes on the coordinate plane and reflect them in the axes
 | * Explain how to write a fraction in its simplest form
* Reason and apply their knowledge of how to write a fraction in its simplest form
* Use their knowledge of how to write a fraction in its simplest form when solving addition and subtraction problems (1)
* Use their knowledge of how to write a fraction in its simplest form when solving addition and subtraction problems (2)
* Use their knowledge of how to write a fraction in its simplest form when solving multiplication problems
* Explain, using an image, how to add related fractions (unit fractions)
* Explain what is meant by ‘related fractions’
* Explain, without using an image, how to add related fractions
* Use their knowledge of adding related fractions to solve problems in a range of contexts
* Explain, with and without using an image, how to subtract related fractions (unit fractions)
* Use their knowledge of adding and subtracting related fractions to solve problems in a range of contexts
* Explain, with and without using an image, how to add and subtract related fractions (non-unit fractions)
* Explain, with and without using an image, how to add and subtract related fractions (non-unit fractions that bridge the whole)
* Use their fraction sense to fraction addition, subtraction and comparison
* Explain how to add or subtract non-related fractions with different denominators
* Use their knowledge of adding or subtracting non-related fractions with different denominators to solve problems in a range of contexts (non-related fractions)
* Explain how to compare pairs of non-related fractions (converting to common denominators)
* Explain how to compare pairs of non-related fractions (using fraction sense)
* Explain how to compare pairs of non-related fractions (using common numerators)
* Explain which method for comparing non-related fractions is most efficient
* Explain how to multiply two unit fractions
* Explain how to multiply two non-unit fractions
* Explain how to divide a unit fraction by a whole number
* Explain how to divide a non-unit fraction by a whole number
* Explain when and how to divide efficiently a fraction by a whole number
* Explain what percent means
* Explain how to represent a percentage in different ways
* Explain how to convert percentages to decimals and fractions (with a denominator of 100)
* Explain how to convert a percentage to a fraction (without denominator of 100)
* Use their knowledge of fraction-decimal-percentage conversions to solve conversion problems in a range of contexts
* Use their knowledge of calculating 50%, 10% and 1% of a number to solve problems in a range of contexts
* Use their knowledge of calculating common percentages of a number to solve problems in a range of contexts
* Use their knowledge of calculating any percentage of a number to solve problems in a range of contexts
* Explain how to solve problems where the percentage part and the size of the part is known and the whole is unknown
* Explain how to solve problems where the known percentage part and the size of the part changes the whole
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| **Summer** |
| **Knowledge** | **Unit 8****Statistics** | 6AS/MD–3 Solve problems involving ratio relationships | 6AS/MD–2 Derive related calculations | 6AS/MD–4 Solve problems with 2 unknowns | **Unit 12****Order of Operations** | **Unit 13****Mean Average** |
| **Unit 9****Ratio and Proportion** | **Unit 10****Calculating using knowledge of structures**  | **Unit 11****Solving Problems with two unknowns** |
| **Progression Of Skills** | Will be updated soon. | * Describe the relationship between two factors (in a ratio context)
* Explain how to use multiplication and division to calculate unknown values (two variables)
* Explain how to use multiplication and division to calculate unknown values (three variables)
* Explain how to use a ratio grid to calculate unknown values
* Explain how to use multiplication to solve correspondence problems
* Explain how and why scaling is used to make and interpret maps
* Use their knowledge of multiplication and division to solve scaling problems in a range of contexts
* Identify and describe the relationship between two shapes using scale factors (squares)
* Identify and describe the relationship between two shapes using scale factors and ratios (regular polygons)
* Identify and describe the relationship between two shapes using scale factors and ratios (irregular polygons)
 | * Explain how to balance equations with addition expressions
* Explain how to balance equations with subtraction expressions
* Explain how to balance equations with addition or subtraction expressions
* Explain how to balance equations with addition and subtraction expressions
* Use their knowledge of balancing equations to solve problems
 | * Compare the structure of problems with one or two unknowns
* Compare the structure of problems with two unknowns
* Represent the structure of contextual problems with two unknowns
* Represent a problem with two unknowns using a bar model
* Explain why sometimes there is only one solution to a sum and difference problem
* Explain why sometimes there is only one solution to a sum and multiple problem
* Explain the values a part-whole model could represent
* Use a bar model to visualise how to solve a problem with two unknowns
* Use diagrams to explain how to solve a spatial problem
* Explain how to represent an equation with a bar model
* Solve problems with two unknowns in a range of contexts
* Systematically solve problems with two unknowns using ‘trial and improvement’ (one and several solutions)
* Explain how I know I have found all possible solutions to problems with two unknowns
* Explain how to balance an equation with two unknowns
* Systematically solve problems with two unknowns using ‘trial and improvement’ (one, several and infinite solutions).
 | * Explain how addition and subtraction can help to solve multiplication problems efficiently (I)
* Explain how addition and subtraction can help to solve multiplication problems efficiently (II)
* Explain how the distributive law applies to multiplication expressions with a common factor (addition)
* Use their knowledge of the distributive law to solve equations including multiplication, addition and subtraction
* Explain how addition and subtraction can help to solve division problems efficiently
* Explain how the distributive law applies to division expressions with a common divisor (addition)
* Explain how the distributive law applies to division expressions with a common divisor (subtraction)
* Use their knowledge of the distributive law to solve equations including division, addition and subtraction.
 | * Explain the relationship between the mean and sharing equally
* Explain how to calculate the mean of a set of data
* Explain how the mean changes when the total quantity or number of values changes
* Explain how to calculate the mean when one of the values in the data set is zero or missing
* Explain how to use the mean to make comparisons between two sets of information
* Explain when the mean is not an appropriate representation of a set of data.
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