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 relationships  6AS/MD–2 Derive related calculations | Multiples of 1000 | 6NPV–1 Powers of 10  6NPV–2 Place value in numbers up to 10,000,000  6NPV–3 Numbers up to 10 million in the linear number system  6NPV–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 fractions  6F–2 Express fractions in a common denomination  6F–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. |