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**Year 6 Objectives**

**Place Value**

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| COUNTING   * Use negative numbers in context, and calculate intervals across zero. * Count on/back in steps of 25, 0.2, 0.25, 0.5. * Count on/back in steps of 0.1, 0.2, 0.25, 0.5 and then back. |
| COMPARING NUMBERS   * Read, write, order and compare numbers up to 10000000 and determine the value of each digit. * Order positive and negative whole numbers. * Find the difference between a positive and a negative integer, or two negative integers, in the context such as temperature or a number line. * Order a set of negative integers. * Investigate products of odd / even numbers. |
| IDENTIFYING, REPRESENTING & ESTIMATING NUMBERS   * Use vocabulary of estimation and approximation. |
| READING & WRITING NUMBERS   * Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit. |
| UNDERSTANDING PLACE VALUE   * Identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1 000 where the answers are up to three decimal places. |
| ROUNDING   * Round any whole number to a required degree of accuracy. * Round whole numbers to the nearest 10, 100, 1000. * Solve problems which require answers to be rounded to specified degrees of accuracy. |
| PROBLEM SOLVING   * Solve number and practical problems that involve all of the above. * Develop calculator skills; use a calculator effectively. * Solve mathematical problems or puzzles. Recognise patterns and generalise. * Make general statements about them and give examples. * Solve number puzzles and explain methods and reasoning. |

**Addition and Subtraction**

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| NUMBER BONDS   * Find pairs with sum of 100; multiples of 50 with sum 1000, decimals with sum of 0.1, 1, 10. |
| MENTAL CALCULATION   * Perform mental calculations, including with mixed operations and large numbers. * Use their knowledge of the order of operations to carry out calculations involving the four operations. * Add/subtract any pair of two-digit numbers including crossing 100; * Derive sums and differences, e.g. 760 ± 280. * Add/subtract a multiple of 10, 100, 1000 and adjust. |
| WRITTEN METHODS   * If appropriate, use informal pencil and paper methods. * Extend written methods to column + and –numbers involving decimals. |
| INVERSE OPERATIONS, ESTIMATING & CHECKING ANSWERS   * Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. * Choose appropriate operations/calculation methods. * Explain working. * Check by adding in reverse order, including with a calculator. |
| PROBLEM SOLVING   * Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. * Solve problems involving addition, subtraction, multiplication and division. * Use all four operations to solve money or ‘real life’ word problems. |

**Multiplication and Division**

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| MULTIPLICATION & DIVISION FACTS   * Recall multiplication and division facts to 12 x 12. * Use known facts and place value to multiply and divide mentally. * Use relationship between multiplication and division. |
| MENTAL CALCULATION   * Perform mental calculations, including with mixed operations and large numbers. * Multiply mentally any two-digit number by a one-digit number. * Multiply or divide whole numbers by 10, 100 or 1000. * Understand and use relationships between the 4 operations, and the principles of the arithmetic laws. * Use related facts and doubling or halving e.g. halve an even number, double the other; multiply by 25, by x 100, then \* by 4. * Double decimals e.g. 3.8 x 2, 0.76 x 2. * Express a quotient as a fraction, or as a decimal rounded to 1 decimal place. Dividing £ and pence by a two-digit number to give £ and pence. * Round up or down after division depending on the context. |
| WRITTEN CALCULATION   * Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. * Divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. * Multiply HTU by TU. * Divide HTU by TU ( long division, whole number answer). * Extend written methods to ThHTU x U and short multiplication involving decimals. * Extend written methods to short division of TU or HTU (mixed number answer) and of decimals. |
| PROPERTIES OF NUMBERS: MULTIPLES, FACTORS, PRIMES, SQUARE & CUBE NUMBERS   * Identify common factors, common multiples and prime numbers. * Give pairs of factors for whole numbers to 100. Use tests of divisibility. * Recall squares to 12 x 12. * Recognise multiples up to 10 x 10. * Find simple common multiples. * Recognise primes to at least 20. * Find prime factors. * Factorise numbers to 100 into prime factors. |
| ORDER OF OPERATIONS   * Use their knowledge of the order of operations to carry out calculations involving the four operations. |
| INVERSE OPERATIONS, ESTIMATING & CHECKING ANSWERS   * Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. * Approximate first. * Explain working. * Check by estimating. * Use inverse operation including with a calculator. |
| PROBLEM SOLVING   * Solve problems involving addition, subtraction, multiplication and division * Use all four operations to solve money or ‘real life’ word problems, including finding percentages and VAT. * Choose appropriate operations/ calculation methods. |

**Algebra**

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| EQUATIONS   * Express missing number problems algebraically. * Use brackets. * Find pairs of numbers that satisfy number sentences involving two unknowns. * Enumerate all possibilities of combinations of two variables. |
| FORMULAE   * Use simple formulae. * Recognise when it is possible to use **formulae** for area and volume of shapes. |
| SEQUENCES   * Generate and describe linear number sequences. * Recognise and extend number sequences such as square, triangular numbers. * Investigate number sequences. * Develop a generalised relationship in words; express it in a formula using symbols. |

**Fractions including decimals and percentages**

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| COUNTING IN FRACTIONAL STEPS   * Count up and down in ½, ¼, etc using whole numbers and decimal numbers. |
| RECOGNISING FRACTIONS   * Recognise equivalent fractions. * Know simple fractions as percentages; find simple percentages. * Understand percentage as the number of parts in every 100. |
| COMPARING FRACTIONS   * Compare and order fractions, including fractions >1. * Change an improper fraction to a mixed number and vice versa. * Reduce fractions by cancelling. * Order fractions by converting to common denominator, and position them on a number line. * Use fractions as 'operators'; find fractions of numbers and quantities. * Begin to convert fractions to decimal using division. * Express simple fractions as percentages. * Find simple percentages of whole number quantities, include using calculator. |
| COMPARING DECIMALS   * Identify the value of each digit in numbers given to three decimal places. * Multiply and divide decimals by 10 or 100, and integers by 1000, and explain the effect. * Use decimal notation for tenths and hundredths; extend to thousandths for measurements. Know what each digit represents. * Give a decimal lying between two others e.g. 3.4 and 3.5. * Order a set of mixed numbers or measurements with up to 3 decimal places. * Round a number to the nearest tenth or nearest whole number. |
| ROUNDING INCLUDING DECIMALS   * Solve problems which require answers to be rounded to specified degrees of accuracy. * Round decimals to nearest whole number or nearest tenth. |
| EQUIVALENCE   * Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. * Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8). * Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. |
| ADDITION & SUBTRACTION OF FRACTIONS   * Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. |
| MULTIPLICATION & DIVISION OF DECIMALS   * Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. 1/4 × 1/2 = 1/8). * Multiply one-digit numbers with up to two decimal places by whole numbers. * Divide proper fractions by whole numbers (e.g. 1/3 ÷ 2 = 1/6). * Multiply one-digit numbers with up to two decimal places by whole numbers. * Multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places. * Identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places. * Use written division methods in cases where the answer has up to two decimal places. |
| RATIO & PROPORTION   * Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. * Solve problems involving the calculation of percentages and the use of percentages for comparison. * Solve problems involving similar shapes where the scale factor is known or can be found. * Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. * Solve simple problems involving ratio and proportion. |

**Position and direction**

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| POSITION, DIRECTION & MOVEMENT   * Describe positions on the full coordinate grid (all four quadrants). * Read and plot co-ordinates in all four quadrants. * Draw and translate simple shapes on the coordinate plane, and reflect them in the axes. * Recognise where a shape will be after two translations. * Recognise where shape will be after 90\* rotation about vertex. * Recognise where shape will be after reflection in a line not parallel to a side or in two mirrors at 90\*. * Consolidate work on translations and rotations. |
| PATTERN   * Make and investigate a general statement about shapes. |

**Shape**

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| IDENTIFYING SHAPES & THEIR PROPERTIES   * Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius. * Solve shape puzzles. * Explain methods and reasoning orally and in writing. * Visualise 3-D shapes from 2-D drawings. * Identify nets of closed cube. * Recognise and explain patterns and relationships, generalise and predict. |
| DRAWING & CONSTRUCTING   * Draw 2-D shapes using given dimensions and angles. * Recognise, describe and build simple 3-D shapes, including making nets. * Make shapes with increasing accuracy. |
| COMPARING & CLASSIFYING   * Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons. * Classify quadrilaterals using side/angle properties. |
| ANGLES   * Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. * Recognise, estimate acute and obtuse angles. * Use protractor to measure and draw acute/obtuse angles to 1\*. * Check angle sum of triangle is 180\*. * Calculate angles in triangle or around a point. |

**Measurement**

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| MEASURING & CALCULATING   * Solve problems involving the calculation and conversion of **units of measure**, using decimal notation up to three decimal places where appropriate.   **Length:**   * Use, read and write standard metric units of length, abbreviations and relationships. Convert larger to smaller units of length and vice versa. * Know mile and km equivalents. * Suggest suitable units/equipment to estimate or measure length. * Record estimates/measurements from scales to suitable degree of accuracy. Use all four operations to solve measurement word problems, including time. * Choose appropriate operations/calculation methods. Explain working.   **Mass:**   * Use, read and write standard metric units of mass and abbreviations. * Convert larger to smaller units and vice versa. * Know approximate metric equivalents for pounds (lb) and ounces (oz). * Suggest suitable units and equipment to estimate or measure mass.   **Capacity:**   * Use, read and write metric units of capacity, including abbreviations. * Convert larger to smaller units of capacity, and vice versa. * Know approximate metric equivalents for pint and gallon. * Suggest suitable units and equipment to estimate or measure capacity. * Recognise that shapes with the same areas can have different **perimeters** and vice versa. * Calculate perimeter of rectangles and simple compound shapes. * Calculate the area of parallelograms and triangles. * Use formula for area of rectangle. * Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm3) and cubic metres (m3), and extending to other units [e.g. mm3 and km3]. * Recognise when it is possible to use formulae for area and volume of shapes. |
| TELLING THE TIME   * Appreciate different times around the world. |
| CONVERTING   * Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places. * Convert between miles and kilometres. * Convert between km, m, cm, mm. * Convert between kg and g, litres and millilitres, seconds and minutes. |

**Statistics**

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| INTERPRETING, CONSTRUCTING & PRESENTING DATA   * Interpret and construct pie charts and line graphs and use these to solve problems. * Use language of probability, including events with equally likely outcomes. * Present and interpret grouped discrete data on a bar chart. * Use prepared computer database to compare presentations of data. * Represent, extract and interpret data in a line graph (e.g. graph to convert miles to kilometres). Recognise that intermediate points have meaning. * Extract information from a simple frequency table and convert the data to percentages, using a calculator where appropriate. * Interpret a simple pie chart, using fractions or percentages. |
| SOLVING PROBLEMS   * Calculate and interpret the mean as an average. * Find the mode and range of a set of data. * Begin to find median and mean. * Solve a problem by representing, extracting and interpreting data in frequency tables and bar charts with grouped discrete data. |