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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.
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| 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.
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| IDENTIFYING, REPRESENTING & ESTIMATING NUMBERS * Use vocabulary of estimation and approximation.
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| READING & WRITING NUMBERS * Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.
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| 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.
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| 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.
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| 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.
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**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.
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| 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.
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| WRITTEN METHODS * If appropriate, use informal pencil and paper methods.
* Extend written methods to column + and –numbers involving decimals.
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| 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.
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| 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.
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**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.
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| 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.
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| 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.
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| 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.
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| ORDER OF OPERATIONS * Use their knowledge of the order of operations to carry out calculations involving the four operations.
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| 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.
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| 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.
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**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.
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| FORMULAE * Use simple formulae.
* Recognise when it is possible to use **formulae** for area and volume of shapes.
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| 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.
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**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.
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| RECOGNISING FRACTIONS * Recognise equivalent fractions.
* Know simple fractions as percentages; find simple percentages.
* Understand percentage as the number of parts in every 100.
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| 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.
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| 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.
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| 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.
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| 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.
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| ADDITION & SUBTRACTION OF FRACTIONS * Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.
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| 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.
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| 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.
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**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.
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| PATTERN * Make and investigate a general statement about shapes.
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**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.
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| 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.
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| 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.
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| 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.
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**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.
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| TELLING THE TIME * Appreciate different times around the world.
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| 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.
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**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.
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| 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.
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