Year 6 Maths Objectives

Place Value

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 10 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers) 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 (appears also in Understanding Place Value)
UNDERSTANDING PLACE VALUE	Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (appears also in Reading and Writing Numbers) *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.*
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, generalise. Make general statements about them and give examples. Solve number puzzles and explain methods and reasoning.

Addition & Subtraction

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	Use estimation to check answers to calculations and determine, in the context

OPERATIONS, ESTIMATING & CHECKING ANSWERS	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 & Division

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. Mentally multiply any two-digit number to 50 by a one-digit number. *Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$)* 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. Partition, e.g. 87 x6, 3.4 x 3. 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 Division HTU by TU (long division, whole number answer). *Use written division methods in cases where the answer has up to two decimal places* (copied from Fractions (including decimals)) Use informal pencil and paper methods to support, record or explain x and *. 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. Know tests of divisibility. Recognise primes to at least 20. Find prime factors. Factorise numbers to 100 into prime factors.

	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination
	Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3.
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 *Solve problems involving similar shapes where the scale factor is known or can be found* Use all four operations to solve money or 'real life' word problems, including finding percentages and VAT. Choose appropriate operations/ calculation methods.

Algebra

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* (copied from Measurement)
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 & percentages)

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. Use a calculator to compare two fractions.

	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. $^1/_4 \times ^1/_2 = ^1/_8$)
	Multiply one-digit numbers with up to two decimal places by whole numbers
	Divide proper fractions by whole numbers (e.g. $^1/_3 \div 2 = ^1/_6$)
	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/
	Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$)
	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 [for example, of measures, and such as 15% of 360] 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.

Geometry: Position & Direction

POSITION, DIRECTION &	Describe positions on the full coordinate grid (all four quadrants)
	Read and plot co-ordinates in all four quadrants.

MOVEMENT	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.

Geometry: Properties of shape

IDENTIFYING SHAPES & THEIR PROPERTIES	Recognise, describe and build simple 3-D shapes, including making nets
	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

COMPARING & ESTIMATING	Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3.
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.
	Know relationships. 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. Know and use the relationships between them. 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 the area of a shape formed from rectangles, including using a calculator with memory. calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [e.g. mm^3 and km^3]. 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 Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate Convert between miles and kilometres Convert between km, m, cm, mm. Convert between kg and g, litres and millilitres, seconds and minutes.

Statistics

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.