Numeracy Objectives

Numeracy across the curriculum	Start of Year 7	Year 7	Year 8	Year 9 (including *extension objectives*)
Have a sense of the size of a number and where it fits into the number system	**Place value, ordering and rounding** - Recognise and extend number sequences. - Estimate by approximating (round to nearest 10, 100 or 1000).	**Place value, ordering and rounding** - Compare and order decimals; know that when comparing measurements they must be in the same units. - Round positive whole numbers to the nearest 10, 100 or 1000 and decimals to the nearest whole number or one decimal place.	**Place value, ordering and rounding** - Round decimals to the nearest whole number or to one or two decimal places. **Integers, powers and roots** - Use squares, positive and negative square roots, cubes and cube roots, and index notation for small positive integer powers.	**Place value, ordering and rounding** - Multiply and divide by any integer power of 10. *Understand upper and lower bounds; round numbers to three decimal places and a given number of significant figures.* *Begin to write numbers in standard form.* **Integers, powers and roots** - Use simple instances of the index laws.
Recall mathematical facts confidently **Calculate accurately and efficiently, both mentally and with pencil and paper, drawing on a range of calculation strategies**	**Calculations with whole numbers and decimals** - Understand and use the relationships between the four operations, and the principles of the arithmetic laws. - Use brackets. - Add and subtract two two-digit numbers mentally. - Use column addition and subtraction of numbers involving decimals. - Know multiplication facts to 10 × 10, and quickly derive associated division facts. - Multiply a two-digit number by a single-digit number mentally.	**Calculations with whole numbers and decimals** - Know and use the order of operations, including brackets. - Use standard column procedures to add and subtract whole numbers and decimals with up to two places. - Multiply and divide three-digit by two-digit whole numbers; extend to multiplying and dividing decimals with one or two places by single-digit whole numbers.	**Calculations with whole numbers and decimals** - Use the order of operations, including brackets, with more complex calculations. - Use standard column procedures for multiplication and division of integers and decimals; understand where to position the decimal point by considering equivalent calculations.	**Calculations with whole numbers and decimals** Understand the effects of multiplying and dividing by numbers between 0 and 1.

Numeracy Objectives

Numeracy across the curriculum	Start of Year 7	Year 7	Year 8	Year 9 (including *extension objectives*)
Calculate using fractions, decimals and percentages and use proportional reasoning to simplify and solve problems	**Fractions, decimals, percentages, ratio and proportion** • Reduce a fraction to its simplest form by cancelling common factors. • Use a fraction as an 'operator' to find fractions of numbers or quantities. • Order a mixed set of numbers or measurements with up to three decimal places. • Understand percentage as the number of parts in every 100. • Find simple percentages of small whole-number quantities.	**Fractions, decimals, percentages, ratio and proportion** • Simplify fractions by cancelling all common factors. • Recognise the equivalence of percentages, fractions and decimals. • Calculate simple percentages and fractions of quantities. • Use ratio notation, reduce a ratio to its simplest form, and divide a quantity into two parts in a given ratio. • Solve simple problems about ratio and proportion using informal strategies.	**Fractions, decimals, percentages, ratio and proportion** • Add and subtract fractions by writing them with a common denominator; calculate fractions of quantities. • Calculate percentages and find the outcome of a given percentage increase or decrease. • Reduce a ratio expressed in different units to its simplest form; divide a quantity into two or more parts in a given ratio. • Use the unitary method to solve simple word problems involving ratio and direct proportion.	**Fractions, decimals, percentages, ratio and proportion** • Add, subtract, multiply and divide fractions; cancel common factors before multiplying or dividing. • Compare two ratios; interpret and use ratio in a range of contexts. • Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole.
Use calculators appropriately and efficiently, and select from the display the number of figures appropriate to the context of a calculation	**Calculator methods** • Develop calculator skills and use a calculator effectively.	**Calculator methods** • Carry out calculations with more than one step using brackets and the memory; use the square root and sign change keys. • Enter numbers and interpret the display in different contexts (decimals, percentages, money, metric measures).	**Calculator methods** • Carry out more difficult calculations effectively and efficiently using the function keys for sign change, powers, roots and fractions; use brackets and the memory. • Enter numbers and interpret the display (negative numbers, fractions, decimals, percentages, money, metric measures, time).	**Calculator methods** • Use a calculator efficiently and appropriately to perform complex calculations with numbers of any size, knowing not to round during intermediate steps of a calculation. • Use the constant, π and sign change keys, function keys for powers, roots and fractions, brackets and the memory.
Use simple formulae and substitute numbers in them	**Reasoning and generalising** • Develop from explaining a generalised relationship in words to expressing it in a formula, using letters as symbols.	**Equations, formulae and identities** • Use simple formulae; substitute positive integers into simple linear expressions and formulae and, in simple cases, derive a formula.	**Equations, formulae and identities** • Use formulae; substitute integers into simple formulae, including examples that lead to an equation to solve.	**Equations, formulae and identities** • Use more complex formulae; substitute numbers into expressions and formulae; derive a formula and, in simple cases, change its subject.

Numeracy Objectives

Numeracy across the curriculum	Start of Year 7	Year 7	Year 8	Year 9 (including *extension objectives*)
Measure and estimate measurements, choosing suitable units and reading numbers correctly from a range of meters, dials and scales	**Measures** • Use, read and write standard metric units. • Convert smaller to larger units, and vice versa. • Know rough equivalents between common metric and imperial units. • Record estimates and readings from scales to a suitable degree of accuracy.	**Measures and mensuration** • Measure, estimate, calculate and solve problems involving length, area, mass, capacity and angle. • Read and interpret scales on a range of measuring instruments. • Convert one metric unit to another (e.g. g to kg).	**Measures and mensuration** • Measure, estimate, calculate and solve problems involving length, area, volume, capacity, mass, angle and bearings. • Know rough metric equivalents of imperial measures in daily use (feet, miles, pounds, pints, gallons).	**Measures and mensuration** • Measure, estimate, calculate and solve problems in a variety of contexts. • Convert between area measures (mm^2 to cm^2, cm^2 to m^2, and vice versa). • *Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half of the unit in either direction.*
Calculate simple perimeters, areas and volumes, recognising the degree of accuracy that can be achieved	**Measures** • Calculate the perimeter and area of simple compound shapes that can be split into rectangles.	**Measures and mensuration** • Use the formula for the area of a rectangle; calculate the perimeter and area of shapes made from rectangles. • Calculate the surface area of cubes and cuboids.	**Measures and mensuration** • Use formulae for the area of a triangle, parallelogram and trapezium. • Use the formula for the volume of a cuboid.	**Measures and mensuration** • Use the formulae for the circumference and area of a circle. • Calculate the surface area and volume of right prisms.
Understand and use measures of time and speed, and rates such as £ per hour or miles per litre	**Measures** • Appreciate different times around the world. • Solve problems using time.	**Measures and mensuration** • Measure, estimate, calculate and solve problems involving time. **Sequences, functions and graphs** • Begin to plot and interpret the graphs of simple linear functions arising from real-life situations.	**Measures and mensuration** • Measure, estimate, calculate and solve problems involving time. **Sequences, functions and graphs** • Plot the graphs of linear functions arising from real-life problems; discuss and interpret graphs arising from real situations.	**Measures and mensuration** • *Understand and use measures of speed, and other compound measures such as density and pressure.* • *Solve problems involving constant or average rates of change.* **Sequences, functions and graphs** • Plot graphs of functions arising from real-life problems; interpret graphs arising from real situations, including distance–time graphs.

Numeracy Objectives

Numeracy across the curriculum	Start of Year 7	Year 7	Year 8	Year 9 (including *extension objectives*)
Draw plane figures to given specifications and appreciate the concept of scale in geometrical drawings and maps	**Construction** • Measure and draw lines to nearest mm. • Measure and draw acute and obtuse angles to the nearest degree. **Coordinates** • Read and plot coordinates in all four quadrants. **Transformations** • Recognise where a shape will be after: reflection; two translations; a rotation of 90° about one of its vertices.	**Construction** • Use a ruler and protractor to measure and draw lines to the nearest millimetre and angles to the nearest degree. **Coordinates** • Use coordinates in all four quadrants. **Transformations** • Recognise reflection symmetry and rotation symmetry in 2-D shapes. • Recognise translations of 2-D shapes.	**Construction** • Use straight edge and compasses to construct: the mid-point and perpendicular bisector of a line segment; the bisector of an angle; the perpendicular from a point to a line; the perpendicular from a point on a line. **Lines, angles and shapes** • Begin to use plans and elevations. **Transformations** • Enlarge 2-D shapes, given a centre of enlargement and a positive whole-number scale factor. • Make simple scale drawings.	**Construction** • Use straight edge and compasses to construct triangles. **Lines, angles and shapes** • Analyse 3-D shapes through 2-D projections, including plans and elevations. **Transformations** • Identify the scale factor of an enlargement. • Use and interpret maps and scale drawings. •
Understand the difference between the mean, median and mode and the purpose for which each is used	**Handling data** • Begin to find the median and mean of a set of data. • Find the mode and range of a set of data.	**Handling data** • For small sets of discrete data: find the mode, median and range, and the modal class for grouped data; calculate the mean, using a calculator for a larger number of items. • Compare two simple distributions using the range and one of the mode, median or mean.	**Handling data** • Calculate statistics, including with a calculator; recognise when it is appropriate to use the range, mean, median and mode and, for grouped data, the modal class; calculate a mean using an assumed mean; construct and use stem-and-leaf diagrams. • Compare two distributions using the range and one or more of the mode, median and mean.	**Handling data** • *Find the median and quartiles for large datasets.* • Compare two or more distributions and make inferences, using the shape of the distributions, the range of data and appropriate statistics.

Numeracy Objectives

Collect data, discrete and continuous, and draw, interpret and predict from graphs, diagrams, charts and tables	**Handling data** • Solve a problem by representing, extracting and interpreting data in tables, graphs, charts and diagrams.	**Handling data** • Collect small sets of data from surveys and experiments. • Construct, on paper and using ICT: bar-line graphs; frequency diagrams for grouped discrete data; pie charts. • Interpret diagrams and graphs, and draw simple conclusions.	**Handling data** • Collect data by observation, controlled experiment (including data logging), or questionnaire. • Construct, on paper and using ICT: pie charts for categorical data; bar charts and frequency diagrams for discrete and continuous data; simple line graphs for time series; simple scatter graphs. • Interpret tables, graphs and diagrams for both discrete and continuous data.	**Handling data** • Gather data from specified secondary sources, including printed tables and lists from ICT-based sources; determine sample size; design data collection sheets. • Construct, on paper and using ICT: scatter graphs; line graphs for time series; *lines of best fit*. • Have a basic understanding of correlation.
Have some understanding of the measurement of probability and risk	**Probability** • Use the language associated with probability to discuss events, including those with equally likely outcomes.	**Probability** • Use the vocabulary and ideas of probability, drawing on experience. • Use the probability scale from 0 to 1.	**Probability** • Use the vocabulary of probability when interpreting the results of an experiment; appreciate that random processes are unpredictable. • Know that if the probability of an event occurring is p, then the probability of it not occurring is $1 - p$. • Estimate probabilities from experimental data.	**Probability** • Use the vocabulary of probability in interpreting results involving uncertainty and prediction. • *Understand relative frequency as an estimate of probability and use this to compare outcomes of experiments.*

Numeracy Objectives

Use and apply mathematics to solve problems **Explain methods and justify reasoning and conclusions, using correct mathematical terms** **Judge the reasonableness of solutions and check them when necessary** **Give results to an appropriate degree of accuracy**	**Applying mathematics** • Identify and use appropriate operations (including combinations of operations) to solve word problems involving numbers and quantities. • Explain methods and reasoning. **Checking results** • Check the results of calculations.	**Applying mathematics** • Solve word problems and investigate in a range of contexts. • Break a complex calculation into simpler steps, choosing and using appropriate and efficient operations, methods and resources. • Explain and justify methods and conclusions, orally and in writing. **Checking results** • Check a result by considering whether it is of the right order of magnitude and by working the problem backwards.	**Applying mathematics** • Use logical argument to establish the truth of a statement. • Represent problems and interpret solutions in algebraic, geometric or graphical form, using correct notation and appropriate diagrams. • Give solutions to an appropriate degree of accuracy in the context of the problem. **Checking results** • Check a result by considering whether it is of the right order of magnitude and by working the problem backwards.	**Applying mathematics** • Solve substantial problems by breaking them into simpler tasks, using a range of efficient techniques, methods and resources, including ICT. • Give solutions to an appropriate degree of accuracy, *recognising limitations on the accuracy of data and measurements*. **Checking results** • Check results using appropriate methods.