

Year 7 Maths Learning Outcomes

Unit 1: Numbers and the Number System

- Find prime numbers and test numbers to see if they are prime.
- Find common factors of numbers.
- Find the highest common factor of numbers in simple cases, including co-prime examples.
- Find common multiples of numbers.
- Recognise and solve problems involving the lowest common multiple.
- Use linear (arithmetic) number patterns to solve problems.
- Recognise and use triangular numbers.
- Recognise and use square and cube numbers.
- Read, write and evaluate powers.
- Define and find square roots (including using the $\sqrt{\quad}$ symbol).
- Define and find cube roots (including using the $\sqrt[3]{\quad}$ symbol), including the use of a scientific calculator.
- Define and find other roots (including using the $\sqrt{\quad}$ symbol), including the use of a scientific calculator.

Extended Learning:

- Use factor trees to find the HCF of a pair of numbers.
- Solve worded problems related to HCF and LCM.
- Identify the relationship between square number and square roots, cube numbers and cube roots etc.
- Identify the triangular numbers.
- Use Eratosthenes sieve to identify prime numbers.

Unit 2: Calculating

- Multiply a positive integer by a power of 10.
- Multiply a decimal by a power of 10.
- Divide a positive integer by a power of 10.
- Divide a decimal by a power of 10.
- Add numbers up to six-digits using a formal written method.
- Add decimals with the same, and different, number of decimal places.
- Subtract numbers up to six-digits using a formal written method.
- Subtract decimals with the same, and different, number of decimal places.
- Multiply a number up to four-digits by a one or two-digit number using a formal written method.
- Transform a multiplication involving decimals to a corresponding multiplication with integers.

- Multiply a large integer up to four-digits by a decimal of up to 2dp using integer multiplication.
- Divide a number up to four-digits by a one or two-digit number using a formal written method.
- Use a formal method to divide a decimal by an integer < 10 .
- Use a formal method to divide a decimal by an integer greater than 10.
- Transform a calculation involving the division of decimals to an equivalent division involving integers.
- Apply the order of operations to multi-step calculations involving up to four operations and brackets.

Extended learning:

- Order a set of numbers including fractions, decimals and negatives.
- Convert accurately between fractions and decimals.

Unit 3: Calculating, Counting and Comparing

- Round a number to a specified number of decimal places.
- Round a number to one significant figure.
- Estimate calculations by rounding numbers to one significant figure.
- Use the signs $<$, $>$ and $=$ to compare numbers.
- Use a compound inequality to compare three or more numbers (e.g. $-1 < 0.5 < 4$).
- Order a set of integers.
- Order a set of decimals.
- Order a set of integers and decimals.
- Order fractions with the same denominator or denominators are a multiple of each other.
- Order fractions where the denominators are not multiples of each other.
- Order mixed numbers and fractions.
- Order a combination of integers, decimals, fractions and mixed numbers.

Extended Learning:

- Use inverse operations when dividing with decimals.
- Solve problems involving order of operations that involve powers and roots.

Unit 4: Visualising/Constructing & Properties of Shapes

- Identify line and rotational symmetry in polygons.
- Understand and use labelling notation for lengths and angles.
- Use ruler and protractor to construct triangles, and other shapes, from written descriptions.
- Use ruler and compasses to construct triangles when all three sides known.
- Know the connection between faces, edges and vertices in 3D shapes.
- Recognise and use nets of 3D shapes.
- Know and solve problems using the properties and definitions of triangles.
- Know and solve problems using the properties and definitions of special types of quadrilaterals (including diagonals).
- Know and solve problems using the properties of other plane figures.

Extended learning:

- Construct triangles from written descriptions.
- Construct triangles when all three sides are known.
- Identify line and rotational symmetry in irregular polygons.

Unit 5: Exploring Fractions, Decimals and Percentages & Proportional Reasoning

- Write one quantity as a fraction of another where the fraction is less than 1.
- Write one quantity as a fraction of another where the fraction is greater than 1.
- Write a percentage as a fraction.
- Write a quantity as a percentage of another.
- Describe a comparison of measurements or objects using ratio notation a:b.
- Simplify a ratio by cancelling common factors.
- Divide a quantity in two parts in a given part:part ratio
- Solve simple problems involving a ratio a:b and one known value.

Extended Learning:

- Identifying equivalent fractions.
- Converting between fractions, decimals and percentages.

Unit 6: Algebraic Proficiency & Pattern Sniffing

- Know the meaning of expression, term, formula, equation, function.
- Know and use basic algebraic notation (the 'rules' of algebra).
- Simplify a simple expression by collecting like terms.
- Simplify more complex expressions by collecting like terms.
- Manipulate expressions by multiplying an integer over a bracket (the distributive law).
- Manipulate expressions by multiplying a single term over a bracket (the distributive law).
- Substitute positive numbers into expressions and formulae.
- Given a function, establish outputs from given inputs and inputs from given outputs.
- Recognise simple arithmetic progressions.
- Use a term-to-term rule to generate a linear sequence.
- Use a term-to-term rule to generate a non-linear sequence.

Extended Learning:

- Use negative and fractional multipliers when expanding brackets.
- Develop expressions to represent a function.
- Use BIDMAS in solving algebraic expressions and formulae.

Unit 7: Measuring Space & Investigating Angles

- Use a ruler to accurately measure line segments to the nearest millimetre.
- Use a protractor to accurately measure angles to the nearest degree.
- Convert fluently between metric units of length.
- Convert fluently between metric units of mass.
- Convert fluently between metric units of volume / capacity.

- Convert fluently between units of time.
- Convert fluently between units of money.
- Recognise and solve problems using vertically opposite angles.
- Recognise and solve problems using angles at a point.
- Recognise and solve problems using angles at a point on a line.

Extended Learning:

- Convert between metric and imperial.
- Consider angles on parallel lines.

Unit 8: Calculating with Fractions, Decimals and Percentages

- Add proper and improper fractions.
- Add mixed numbers.
- Subtract proper and improper fractions.
- Subtract mixed numbers.
- Multiply proper and improper fractions.
- Multiply mixed numbers.
- Divide a proper fraction by a proper fraction.
- Divide improper fractions.
- Divide a mixed number by a proper fraction/mixed number.
- Identify the multiplier for a percentage increase or decrease.
- Use calculators to find a percentage of an amount using multiplicative methods.
- Use calculators to increase and decrease an amount by a percentage using multiplicative methods.
- Compare two quantities using percentages.
- Know that percentage change = $\text{actual change} \div \text{original amount}$.
- Calculate the percentage change in a given situation, including percentage increase / decrease.

Extended Learning:

- Solve problems involving mixed numbers and the four operations.
- Convert mixed numbers into decimals.

Unit 9: Solving Equations and Inequalities

- Solve one-step equations when the solution is a positive integer or fraction.
- Solve two-step equations when the solution is a positive integer or fraction.
- Solve three-step equations when the solution is a positive integer or fraction.
- Solve multi-step equations including the use of brackets when the solution is a positive integer or fraction.
- Solve equations when the solution is an integer or fraction.

Extended Learning:

- Solve equations or inequalities when the solution is a negative number.

Unit 10: Calculating Space & Mathematical Movement

- Calculate perimeters of 2D shapes.
- Use and apply the formula to calculate the area of triangles.
- Use and apply the formula to calculate the area of trapezia.
- Use and apply the formula to calculate the volume of cuboids.
- Find the surface area of cuboids (including cubes).
- Solve geometrical problems on coordinate axes.
- Write the equation of a line parallel to the x-axis or the y-axis.
- Identify and draw the lines $y = x$ and $y = -x$.
- Construct and describe reflections in horizontal, vertical and diagonal mirror lines (45° from horizontal).
- Describe a translation as a 2D vector.
- Construct and describe rotations using a given angle, direction and centre of rotation.
- Solve problems involving rotations, reflections and translations.

Extended Learning:

- Using the volume or surface area, calculate missing lengths of 3D shapes.
- Develop expressions for the surface area of cubes and cuboids with unknown lengths.
- Find and name the equation of the mirror line for a given reflection.
- To be able to perform a simple enlargement given a scale factor.

Unit 11: Presenting Data

- Interpret and construct frequency tables.
- Construct and interpret bar charts and know their appropriate use.
- Construct and interpret comparative bar charts.
- Construct and interpret pie charts and know their appropriate use.
- Construct and interpret vertical line charts.
- Choose appropriate graphs or charts to represent data.

Extended Learning:

- Know the meaning of and use categorical/discrete data.
- Interpret pie charts when the total frequency is not a factor of 360 degrees.
- To be able to use frequency polygons, highlighting the key features.

Unit 12: Measuring Data

- Find the mode of set of data.
- Find the median of a set of data including when there are an even number of numbers in the data set.
- Calculate the mean from a frequency table.
- Find the mode from a frequency table.
- Find the median from a frequency table.
- Calculate and understand the range as a measure of spread (or consistency).
- Analyse and compare sets of data, appreciating the limitations of different statistics (mean, median, mode, range)

Extended Learning:

- To understand how to analyse and compare data.
- Appreciate the limitations of different statistics – mean, mode, median and range.