Cornwallis Academy
Ambitions for All

SMILE
SUCCESSFUL | MOTIVATED | INSPIRED | LEARNING | EXCITED & ENGAGED

Year 8 Mathematics

Statistics, Graphs and Charts

Learning Objectives

- Understand and simplify algebraic powers
- Write and use expressions involving powers
- Expand brackets
- Write and simplify algebraic expressions and formulae using brackets and division
- Factorise expressions
- Find the inverse of a simple function
- Write and solve one-step equations using function machines
- Solve and write two-step equations using function machines
- Solve problems using equations
- Solve equations using the balancing method

What previous knowledge is required?

- Secure understanding of number operations.
- Knowledge of mathematical symbols and order of operations.
- Introduction to variables and simple algebraic expressions from Year 7.
- Ability to solve simple arithmetic problems.

From Y7
Number

- Mental Maths
- Addition and Subtraction
- Multiplication
- Division
- Money and Time
- Negative Numbers
- Factors, multiples and primes
- Square numbers

From Y7
Graphs and Charts

- Line graphs
- Bar charts

How will this term's content help with future learning?

- Forms the foundation for GCSE algebra.
- Leads to solving more complex equations and inequalities.
- Supports work on graphs, functions and coordinate geometry.
- Develops logical reasoning and problem-solving skills used throughout mathematics.

Y9

- Recognising and using Place Value
- Adding and Subtracting Integers and Decimals
- Multiplying Integers and Decimals
- Dividing Integers and Decimals
- Squares, Cubes and Roots
- Order of Operations

Y9

- Plotting and recognising coordinates
- Plotting Horizontal and Vertical Lines
- Plotting Linear Graphs

Common Misconceptions

- Confusing mean, median and mode, or using the wrong average for a given data set.
- Believing the highest value is always the mean.
- Miscalculating the range by adding numbers instead of subtracting the smallest value from the largest.
- Reading graph scales incorrectly, especially when intervals do not increase by 1.
- Assuming all graphs can be used for any type of data.
- Plotting points inaccurately due to misreading axes.
- Interpreting the height of bars rather than the scale values.
- Thinking pie chart sectors should be based on the number of categories rather than the proportion of data.
- Confusing frequency with cumulative frequency.
- Assuming a larger graph or image always represents a larger value, regardless of the scale.
- Ignoring outliers when calculating or interpreting averages.
- Believing that correlation automatically means one variable causes another.
- Comparing data sets without considering both averages and spread.
- Forgetting to label axes, scales or units when constructing graphs.
- Assuming all data displayed in charts is accurate without considering how it was collected or presented.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

- understand and use place value for decimals, measures and integers of any size
- order positive and negative integers, decimals and fractions; use the number line as a
- model for ordering of the real numbers; use the symbols =, ≠, <, >, ≤, ≥
- use the concepts and vocabulary of prime numbers, factors (or divisors), multiples,
- common factors, common multiples, highest common factor, lowest common multiple,
- prime factorisation, including using product notation and the unique factorisation
- property
- use the four operations, including formal written methods, applied to integers, decimals,
- use conventional notation for the priority of operations, including brackets, powers,
- roots and reciprocals
- recognise and use relationships between operations including inverse operations
- use integer powers and associated real roots (square, cube and higher), recognise
- powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations

Expressions and Equations

Learning Objectives

- Understand and simplify algebraic powers
- Write and use expressions involving powers
- Expand brackets
- Write and simplify algebraic expressions and formulae using brackets and division
- Factorise expressions
- Find the inverse of a simple function
- Write and solve one-step equations using function machines
- Solve and write two-step equations using function machines
- Solve problems using equations

- Solve equations using the balancing method

What previous knowledge is required?

- Secure understanding of the four operations with whole numbers, decimals and fractions.
- Knowledge of order of operations.
- Understanding of mathematical symbols and notation.
- Experience of simple algebraic expressions and variables from Year 7.
- Ability to solve basic arithmetic problems.

From Y7

Expressions and Equations

- Functions
- Simplifying expressions
- Writing expressions
- Substituting into formulae
- Writing formulae

How will this term's content help with future learning?

- Provides the foundation for all GCSE algebra topics.
- Supports future work on equations, inequalities and formulae.
- Develops problem-solving and logical reasoning skills.
- Prepares students for studying graphs, functions and coordinate geometry.
- Enables students to model real-world situations mathematically.

Yr9/10

Expressions and Equations

- Algebraic Notation
- Collecting Like Terms
- Multiplying Terms
- Dividing Terms
- Simplifying Expressions using the Index Laws
- Expanding Single Brackets
- Expanding and Simplifying Multiple Single Brackets
- Factorising a Linear Expression
- Factorisation
- Expressions, Equations, Formulae and Identities
- Writing Formulae
- Substitution into Formulae

Common Misconceptions

- Combining unlike terms (e.g. 3a + 2b = 5ab).
- Thinking that a^2 is the same as $2a$.
- Forgetting that multiplication is implied in algebraic notation (e.g. 3a means 3 × a).
- Applying operations to only part of an expression when expanding brackets.
- Using incorrect inverse operations when solving equations.
- Believing variables represent a single fixed value in every context.
- Failing to maintain equality by performing different operations on each side of an equation.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

Use and interpret algebraic notation, including:

- ab in place of a × b
- 3y in place of y + y + y and 3 × y
- a2 in place of a × a, a3 in place of a × a × a; a2 b in place of a × a × b
- a/b in place of a ÷ b
- coefficients written as fractions rather than as decimals
- brackets

Substitute numerical values into formulae and expressions, including scientific formulae
Understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors
Simplify and manipulate algebraic expressions to maintain equivalence by:

- collecting like terms
- multiplying a single term over a bracket
- taking out common factors
- expanding products of two or more binomials

Real-life Graphs

Learning Objectives

- Draw, use and interpret conversion graphs
- Interpret a distance–time graph
- Draw a simple distance–time graph
- Draw and use graphs to solve distance–time problems
- Draw and interpret line graphs
- Draw and interpret line graphs and identify trends
- Draw and interpret linear and non-linear graphs from a range of sources
- Draw and interpret curved graphs from a range of sources

What previous knowledge is required?

From Y7

Real-Life Graphs

- Straight line graphs
- Coordinates

How will this term's content help with future learning?

- Provides a foundation for GCSE graph work, including gradients and graph interpretation.
- Supports future study of linear and non-linear functions.
- Develops problem-solving skills through modelling real-life situations.
- Links algebra and geometry through graphical representation.
- Supports learning in Science and Geography where graphs are used to analyse data and trends.
- Prepares students for interpreting graphical information in examinations and real-world contexts.

Yr9/10

Real-Life Graphs

- Horizontal and Vertical Lines
- Plotting Linear Graphs
- Real-life graphs
- Distance-time graphs
- Water flow

Common Misconceptions

- Confusing the shape of a distance–time graph with the actual route travelled.
- Thinking a steeper line on a distance–time graph means a steeper hill rather than a faster speed.
- Misreading scales on the axes.

- Assuming all graphs must be straight lines.
- Confusing linear and non-linear relationships.
- Reading values from the wrong axis.
- Believing a graph that slopes downward means a negative distance rather than a decrease in a quantity.
- Drawing graphs without using consistent scales.
- Assuming points should always be joined regardless of the data type.
- Confusing speed with distance on distance–time graphs.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

- Describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)

- Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data

- Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs

Decimals and Ratio

Learning Objectives

- Round decimals to 2 or 3 decimal places
- Round numbers to a given number of significant figures
- Round numbers to an appropriate degree of accuracy
- Order decimals of any size, including positive and negative decimals
- Multiply any number by 0.1 and 0.01
- Multiply larger numbers
- Multiply decimals with up to and including 2 decimal places
- Divide by 0.1 and 0.01
- Multiply and divide by decimals
- Solve problems involving decimals and all four operations
- Divide a quantity into three or more parts in a given ratio
- Use ratios involving decimals
- Solve ratio and proportion problems
- Use unit ratios

What previous knowledge is required?

From Year 7 – Number and Ratio

- Understanding of place value for whole numbers and decimals.
- Comparing and ordering whole numbers and simple decimals.
- Addition, subtraction, multiplication and division with whole numbers.
- Basic multiplication and division by powers of 10.
- Introduction to ratio notation and sharing amounts in a ratio.
- Understanding equivalent fractions and percentages.

From Year 7 - **Decimals and Ratio**

- Direct proportion
- Writing ratios

- Using ratios

How will this term's content help with future learning?

- Develops fluency with decimal calculations needed throughout Key Stage 3 and GCSE Mathematics.
- Supports work with percentages, fractions, measures and financial mathematics.
- Provides the foundation for proportional reasoning and scale factors.
- Prepares students for algebraic manipulation involving decimal values.
- Supports applications in Science, Geography, Design Technology and everyday problem-solving.
- Builds confidence in selecting appropriate levels of accuracy when interpreting results.

Y9

Decimals and Ratio

- Simplifying ratios and proportions
- Place value
- Converting decimals and fractions

Common Misconceptions

- Confusing decimal places with significant figures.
- Thinking that multiplying by 0.1 makes a number larger.
- Misplacing the decimal point when multiplying or dividing by 10, 0.1 or 0.01.
- Believing that a decimal with more digits is always larger (e.g. thinking 0.56 < 0.8).
- Forgetting to align decimal points when performing calculations.
- Treating ratio parts as separate quantities rather than parts of a whole.
- Adding ratio numbers together incorrectly when sharing quantities.
- Confusing ratio with fractions or percentages.
- Assuming proportional relationships are always additive rather than multiplicative.
- Errors when simplifying or scaling ratios involving decimals.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

Key Stage 3 National Curriculum – Number and Ratio, Proportion and Rates of Change

- Order positive and negative integers, decimals and fractions.
- Use place value and powers of 10 to calculate efficiently.
- Round numbers and measures to an appropriate degree of accuracy.
- Use the four operations, including formal written methods, applied to decimals.
- Understand and use ratio notation.
- Divide a quantity into two or more parts in a given ratio.
- Express one quantity as a fraction of another and relate ratios to proportion.
- Use scale factors, ratios and rates in practical contexts.
- Solve problems involving ratio, proportion and rates of change.

Lines and Angles

Learning Objectives

- Classify quadrilaterals by their geometric properties
- Solve geometric problems using side and angle properties of special quadrilaterals
- Identify alternate angles on a diagram
- Understand proofs of angle facts
- Identify corresponding angles
- Solve problems using properties of angles in parallel and intersecting lines
- Calculate the sum of the interior and exterior angles of a polygon
- Work out the sizes of interior and exterior angles of a polygon

- Solve geometric problems, showing reasoning
- Solve problems involving angles by setting up equations

What previous knowledge is required?

- Measuring and drawing angles accurately.
- Recognising different types of angles.
- Understanding lines, angles and triangles.
- Drawing triangles accurately using a ruler and protractor.
- Calculating missing angles on a straight line and around a point.
- Using angle facts in triangles.

From Yr7

- Measuring and drawing angles
- Lines, angles and triangles
- Drawing triangles accurately
- Calculating angles
- Angles in a triangle

How will this term's content help with future learning?

- Provides the foundation for GCSE geometry and proof.
- Develops reasoning and justification skills needed for higher-level mathematics.
- Supports future work on polygons, congruence and similarity.
- Links geometry with algebra through forming and solving equations.
- Prepares students for coordinate geometry, trigonometry and construction work.
- Strengthens problem-solving skills by applying angle facts in increasingly complex contexts.

Yr9

- Basic Angle Rules
- Angles in Triangles
- Angles in Quadrilaterals
- Angles in Parallel Lines
- Angles in Polygons
- Angles in Regular Polygons

Common Misconceptions

- Confusing corresponding angles with alternate angles.
- Assuming all quadrilaterals have equal sides or equal angles.
- Forgetting that co-interior angles sum to 180°.
- Believing that the exterior angles of a polygon depend on the number of sides rather than always summing to 360°.
- Mixing up interior and exterior angles.
- Using incorrect angle facts when lines are not parallel.
- Assuming diagrams are always drawn accurately to scale.
- Forgetting to include all angles when calculating angle sums in polygons.
- Making algebraic errors when solving angle equations.
- Believing that proof is simply checking with a diagram rather than using mathematical reasoning.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

Key Stage 3 National Curriculum – Geometry and Measures

- Derive and apply angle facts and relationships.
- Identify and use angle relationships in parallel lines.

- Use properties of triangles, quadrilaterals and other polygons.
- Calculate angles in polygons and understand angle sums.
- Use geometrical reasoning to solve problems.
- Understand and use mathematical proof in geometrical contexts.
- Describe, sketch and analyse properties of 2D shapes using appropriate mathematical language.

Calculating with Fractions

Learning Objectives

- Identify fractions as more than or less than
- Order fractions
- Add and subtract fractions with any size denominator
- Multiply integers and fractions by a fraction
- Use appropriate methods for multiplying fractions
- Find the reciprocal of a number
- Divide integers and fractions by a fraction
- Use strategies for dividing fractions
- Write a mixed number as an improper fraction
- Use the four operations with mixed numbers

What previous knowledge is required?

From Year 7

- Recognising and representing fractions.
- Understanding equivalent fractions.
- Simplifying fractions.
- Comparing and ordering simple fractions.
- Finding fractions of quantities.
- Adding and subtracting fractions with the same denominator.
- Understanding multiplication and division facts.
- Converting between mixed numbers and improper fractions at a basic level.

From Yr7 SoW

- Comparing fractions
- Simplifying fractions
- Working with fractions
- Fractions and decimals

How will this term's content help with future learning?

- Forms a key foundation for GCSE Number topics.
- Supports work with algebraic fractions and algebraic manipulation.
- Develops proportional reasoning needed for ratio, probability and percentage calculations.
- Prepares students for more advanced work involving standard form and complex calculations.
- Strengthens problem-solving skills across mathematics and science.
- Improves fluency and accuracy when working with numerical methods.

Yr 9

- One Quantity as a Fraction of Another
- Equivalent Fractions
- Comparing and Ordering Fractions
- Improper Fractions and Mixed Numbers
- Add and Subtract Fractions and Mixed Numbers

- Fractions of an Amount

Common Misconceptions

- Adding or subtracting denominators when adding fractions (e.g. 1/4 + 1/4 = 2/8).
- Forgetting to find a common denominator before adding or subtracting fractions.
- Confusing the reciprocal of a number with its opposite.
- Multiplying denominators when dividing fractions instead of using the reciprocal.
- Believing a larger denominator means a larger fraction.
- Errors when converting between mixed numbers and improper fractions.
- Cancelling incorrectly when simplifying fractions.
- Forgetting to convert mixed numbers before multiplying or dividing.
- Assuming fraction operations work in exactly the same way as whole-number operations.
- Making errors with negative fractions and mixed numbers.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

Key Stage 3 National Curriculum – Number

- Use the four operations, including formal written methods, applied to positive rational numbers.
- Compare and order fractions.
- Understand and use equivalent fractions.
- Interpret fractions as operators.
- Use standard mathematical notation and conventions.
- Solve problems involving fractions in a variety of contexts.
- Develop fluency and accuracy in numerical calculations involving fractions and mixed numbers.

Straight-line Graphs

Learning Objectives

- Recognise when values are in direct proportion with or without a graph
- Plot graphs and read values to solve problems
- Plot a straight-line graph and work out its gradient
- Write the equations of straight-line graphs in the form $y = mx + c$
- Plot the graphs of linear equations using a table of values

What previous knowledge is required?

From Year 7

- Plotting coordinates in all four quadrants.
- Drawing and interpreting simple graphs.
- Understanding scales and axes.
- Substituting values into simple algebraic expressions.
- Understanding basic algebraic notation.
- Recognising patterns and sequences.
- Knowledge of real-life graphs and linear relationships.

Year 7 units

- Straight line graphs
- Line graphs and more bar charts

How will this term's content help with future learning?

- Forms the foundation for GCSE graph work and coordinate geometry.
- Supports future study of simultaneous equations, inequalities and functions.
- Develops understanding of gradient, rate of change and mathematical modelling.
- Links algebra and geometry by showing how equations can be represented graphically.

- Prepares students for more advanced work on quadratic, cubic and other non-linear graphs.
- Supports applications in Science, Geography and Economics where graphs are used to represent relationships between variables.

Common Misconceptions

- Confusing the gradient with the y-intercept.
- Thinking all straight-line graphs pass through the origin.
- Reading coordinates in the wrong order (y, x instead of x, y).
- Miscounting intervals on graph axes.
- Believing a steeper line means a larger value rather than a greater rate of change.
- Assuming direct proportion graphs can have a non-zero intercept.
- Using incorrect substitution when creating a table of values.
- Plotting points inaccurately due to scale errors.
- Confusing the equation $y = mx + c$with $y = m + c$.
- Assuming graphs are always drawn to scale and should be estimated visually rather than calculated.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

- Describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)

- Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data

- Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs.

- Plot and interpret graphs of linear functions.
- Recognise, sketch and interpret graphs arising from real-life situations.
- Use and interpret the equations of straight-line graphs.
- Generate terms of a sequence from a rule and represent relationships graphically.
- Understand and use linear relationships and direct proportion.
- Interpret mathematical relationships both algebraically and graphically.
- Model situations mathematically and interpret graphical solutions.

Percentages, Decimals and Fractions

Learning Objectives

- Change time to decimal hours
- Recognise recurring and terminating decimals
- Order fractions by converting them to decimals or equivalent fractions
- Recall equivalent fractions, decimals and percentages
- Use different methods to find equivalent fractions, decimals and percentages
- Use the equivalence of fractions, decimals and percentages to compare two proportions
- Express one number as a percentage of another when the units are different
- Work out an amount increased or decreased by a percentage
- Use mental strategies to solve percentage problems
- Use a multiplier to calculate amounts increased or decreased by a percentage

- Use the unitary method to solve percentage problems

What previous knowledge is required?

- Understanding of place value and decimal notation.
- Ordering and comparing decimals and fractions.
- Basic fraction equivalence and simplification.
- Converting simple fractions to decimals and percentages.
- Understanding percentages as "parts per hundred".
- Using the four operations with whole numbers and decimals.
- Basic ratio and proportion concepts.

From Year 7 topics

Calculating With Fractions

- Comparing fractions
- Simplifying fractions
- Working with fractions
- Fractions and decimals

Fractions Percentages and Decimals

From Yr7

- Fractions and decimals
- Understanding percentages
- Percentages of amounts

How will this term's content help with future learning?

- Provides essential number skills required throughout GCSE Mathematics.
- Supports future learning in ratio, proportion, probability and statistics.
- Develops financial literacy through applications involving discounts, profit, loss and interest.
- Prepares students for compound percentage change and growth calculations.
- Strengthens proportional reasoning used across mathematics and science.
- improves fluency in selecting efficient methods for solving numerical problems.

Common Misconceptions

- Thinking that a larger denominator always means a larger fraction.
- Confusing recurring decimals with terminating decimals.
- Forgetting to multiply by 100 when converting a decimal to a percentage.
- Assuming percentages can be compared without considering the whole amount.
- Believing a 50% increase followed by a 50% decrease returns to the original value.
- Misplacing the decimal point when converting between percentages and decimals.
- Confusing percentage increase with percentage decrease.
- Applying percentage changes additively rather than multiplicatively.
- Using incorrect multipliers (e.g. using 1.15 instead of 0.85 for a 15% decrease).
- Forgetting to convert minutes into parts of an hour when changing time to decimal hours.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

Key Stage 3 National Curriculum – Number and Ratio, Proportion and Rates of Change

- Understand and use place value for decimals and percentages.
- Compare and order fractions, decimals and percentages.

- Use standard mathematical notation and conventions.
- Express one quantity as a percentage of another.
- Calculate percentage increases and decreases.
- Solve problems involving percentages and proportional reasoning.
- Use ratio, proportion and rates of change in practical contexts.
- Develop fluency in numerical methods and problem-solving involving fractions, decimals and percentages.

- Interpret fractions and percentages as operators

- Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics

Expressions and Formulae

Learning Objectives

- Solving equations with unknowns on both sides.
- Solving equations with fractions.
- Use the priority of operations when substituting into algebraic expressions
- Substitute values into expressions involving powers and roots
- Write and use formulae
- Substitute into formulae and then solve equations to find unknown values
- Change the subject of a formula
- Multiply out double brackets and collect like terms

What previous knowledge is required?

From Year 8 and Earlier Algebra Topics

- Understanding of algebraic notation and variables.
- Simplifying expressions by collecting like terms.
- Using inverse operations to solve one-step and two-step equations.
- Substituting values into simple expressions.
- Understanding the order of operations (BIDMAS/BODMAS).
- Expanding single brackets.
- Working confidently with fractions and negative numbers.

How will this term's content help with future learning?

- Provides the foundation for GCSE algebra and higher-level mathematics.
- Supports future work on simultaneous equations, inequalities and functions.
- Develops algebraic manipulation skills needed for graphing and coordinate geometry.
- Prepares students for rearranging scientific and mathematical formulae.
- Strengthens logical reasoning and problem-solving skills.
- Supports applications in Science, Economics and other subjects where formulae are used to model relationships.

Common Misconceptions

- Performing different operations on each side of an equation.
- Forgetting to multiply every term when expanding double brackets.
- Incorrectly collecting unlike terms.
- Applying the order of operations incorrectly when substituting values.
- Treating powers and roots as ordinary multiplication or division.
- Making sign errors when moving terms across an equation.
- Thinking that changing the subject means simply moving symbols without using inverse operations.

- Cancelling terms incorrectly in equations involving fractions.
- Confusing expressions, equations and formulae.
- Believing that algebraic manipulation changes the value of a formula rather than creating an equivalent form.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

Key Stage 3 National Curriculum – Algebra

- Use and interpret algebraic notation.
- Substitute numerical values into formulae and expressions.
- Simplify and manipulate algebraic expressions.
- Understand and use the concepts and vocabulary of expressions, equations and formulae.
- Solve linear equations in one variable, including those with unknowns on both sides.
- Rearrange formulae to change the subject.
- Expand products of two or more binomials and simplify the resulting expression.
- Model situations mathematically and express solutions using algebraic methods.

Multiplicative Reasoning

Learning Objectives

- Enlarge 2D shapes using a positive whole number scale factor and centre of enlargement
- Find the centre of enlargement by drawing lines on a grid
- Understand that the scale factor is the ratio of corresponding lengths
- Enlarge 2D shapes using a negative whole number scale factor
- Enlarge 2D shapes using a fractional scale factor
- Find an original value using inverse operations
- Calculate percentage change
- Compound measures
- Direct and inverse proportion

What previous knowledge is required?

From Year 7 and 8 SoW topics

- Using ratios
- Congruency and enlargement
- Translations
- Proportion on graphs
- Understanding of ratio and proportion.
- Multiplication and division with whole numbers, decimals and fractions.
- Percentage calculations, including finding percentages of amounts.
- Coordinates and plotting points on a grid.
- Basic transformations, including enlargement.
- Rearranging calculations using inverse operations.
- Understanding equivalent ratios and scale factors.

How will this term's content help with future learning?

- Provides a foundation for GCSE topics including similarity, trigonometry and scale drawings.
- Supports work on percentage change, compound growth and financial mathematics.
- Develops understanding of direct and inverse proportion, essential for higher-level algebra.
- Prepares students for geometry topics involving enlargements and transformations.

- Supports applications in Science through the use of compound measures such as speed, density and pressure.
- Strengthens problem-solving skills by developing multiplicative rather than additive reasoning.

Common Misconceptions

- Using additive reasoning instead of multiplicative reasoning (e.g. adding rather than multiplying by a scale factor).
- Confusing scale factor with the amount of enlargement.
- Believing the centre of enlargement must always be inside the shape.
- Multiplying area by the scale factor instead of the square of the scale factor.
- Misunderstanding the effect of a negative scale factor.
- Thinking that enlargements change the shape rather than only the size and position.
- Using percentage increase and decrease incorrectly by adding or subtracting percentages directly.
- Forgetting to use inverse operations when finding original values.
- Confusing direct proportion with inverse proportion.
- Assuming compound measures can be calculated using addition rather than multiplication or division.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

Key Stage 3 National Curriculum – Ratio, Proportion and Rates of Change / Geometry and Measures

- Understand and use ratio notation.
- Solve problems involving percentage change.
- Use scale factors, scale diagrams and maps.
- Understand and use multiplicative relationships.
- Solve problems involving direct and inverse proportion.
- Apply ratio, proportion and rates of change in practical contexts.
- Describe and perform enlargements using scale factors and centres of enlargement.
- Use compound units such as speed, density and pressure.
- Develop algebraic and graphical understanding of proportional relationships.

Dealing with Data

Learning Objectives

- Identify primary and secondary data
- Understand sample bias
- Design and use data collection sheets
- Understand what makes a good questionnaire
- Calculating averages
- Displaying and analysing data
- Presenting and comparing data

What previous knowledge is required?

From Year 7 and Earlier Statistics Topics

- Reading and interpreting simple charts and graphs.
- Collecting and recording data using tally charts and frequency tables.
- Understanding basic statistical vocabulary.
- Calculating simple averages.
- Ordering and comparing numerical data.
- Using scales and axes accurately.
- Basic understanding of surveys and questionnaires.

How will this term's content help with future learning?

- Provides a foundation for GCSE Statistics and Data Handling.
- Develops critical thinking when evaluating information from surveys, reports and the media.
- Supports future work involving probability and statistical analysis.
- Builds skills in interpreting evidence and drawing conclusions.
- Supports learning across subjects such as Science, Geography and Business Studies.
- Develops the ability to make informed decisions using data.

Common Misconceptions

- Confusing primary data with secondary data.
- Assuming larger samples are always unbiased.
- Believing questionnaires automatically produce reliable results.
- Using leading or biased questions when collecting data.
- Confusing mean, median and mode.
- Choosing an inappropriate graph or chart for the data type.
- Assuming correlation proves causation.
- Ignoring outliers when interpreting results.
- Believing averages always give a complete picture of a data set.
- Drawing conclusions that are not supported by the data collected.

National Curriculum / Specification

Mathematics programmes of study: key stage 3

Key Stage 3 National Curriculum – Statistics

- Collect, organise and interpret data from primary and secondary sources.
- Construct and interpret appropriate tables, charts and diagrams.
- Describe, interpret and compare distributions of data.
- Calculate and interpret measures of central tendency and spread.
- Understand sampling methods and recognise potential bias.
- Use statistical techniques to analyse and compare data sets.
- Interpret data and communicate findings using appropriate mathematical language.