New Line Learning Academy
Believe and Achieve

Mathematics Intent	Year 9

We believe that all of our pupils can be mathematicians, who enjoy and excel in mathematics at all levels. All The Mathematics Department will provide pupils with exciting, relevant, and challenging Mathematics, delivered by dedicated staff. Pupils will understand the underlying principles of the mathematics they learn, making links and developing reasoning skills and logical thinking. They will progress towards being independent mathematicians who can identify and correct misconceptions for themselves. Pupils will develop their confidence to tackle a range of problems.

To achieve this, staff will design and develop simple and effective systems and interesting and effective teaching ideas and resources to enable classroom delivery and promote mathematics across the school.

At New Line Learning Academy, we teach the National Curriculum for mathematics, which aims to ensure that all pupils:
- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and can recall and apply their knowledge rapidly and accurately to problems.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

Term 1
Topic

Number and Algebra

Big Picture
What are the main ideas and big questions in this topic?

Students develop their understanding of number and algebra, strengthening the mathematical foundations that underpin success across GCSE Mathematics. They revisit number skills including place value, calculation, factors, multiples, indices and rounding before applying these concepts to solve increasingly complex problems with confidence and accuracy. Alongside this, students extend their understanding of algebra by representing mathematical relationships using expressions, equations, formulae and inequalities. They develop fluency in manipulating algebraic expressions, solving equations and reasoning mathematically, recognising algebra as a powerful language for describing patterns, modelling situations and solving problems.

Throughout the topic, students consider the following enquiry questions:
- How do number skills help us solve increasingly complex mathematical problems?
- How can patterns and relationships be represented using algebra?
- Why is algebra described as the language of mathematics?
- How can equations and inequalities help us solve real-world problems?
- How can mathematical reasoning be used to justify solutions?
- How can number and algebra be applied across different areas of mathematics?

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Zoom In
What knowledge, skills and key vocabulary will we learn step by step?

Students begin by strengthening their understanding of number. They develop confidence in place value, adding, subtracting, multiplying and dividing integers and decimal numbers, recognising square numbers, cube numbers and their roots, applying the order of operations, rounding to decimal places and significant figures, estimating answers to calculations and using related calculations to evaluate more complex calculations. Students also investigate factors and multiples, calculate the highest common factor (HCF) and lowest common multiple (LCM), write numbers as the product of their prime factors, apply the laws of indices and raise numbers to negative powers.

Students develop substantive knowledge by understanding the structure of the number system, place value, calculation methods, factors, multiples, prime factorisation, indices and approximation. They recognise how these concepts are connected and how secure numerical understanding underpins mathematical fluency. Alongside this, students strengthen their disciplinary knowledge by selecting efficient calculation methods, estimating and checking the reasonableness of answers, applying number properties to solve unfamiliar problems, recognising patterns and relationships, and communicating mathematical reasoning using precise vocabulary.

Building upon these numerical foundations, students extend their understanding of algebra by identifying and using algebraic notation, collecting like terms using the four operations, simplifying expressions using index laws, expanding single and multiple single brackets, expanding double brackets, factorising linear expressions, and recognising the differences between expressions, equations, formulae and identities. Students also write formulae, solve linear equations involving fractions, negatives and unknowns on both sides, form and solve linear equations, change the subject of formulae, represent linear inequalities, and form and solve linear inequalities.

Students develop substantive knowledge by understanding how algebra represents mathematical relationships, recognising the structure of expressions, equations, formulae and identities, and understanding the rules used to manipulate algebra accurately. Their disciplinary knowledge is strengthened by representing mathematical situations algebraically, selecting appropriate algebraic techniques, solving equations logically, reasoning about patterns and relationships, justifying mathematical methods and communicating solutions using accurate algebraic notation.

Key vocabulary is introduced and revisited throughout the topic, including place value, integer, decimal, estimate, significant figures, factor, multiple, highest common factor, lowest common multiple, prime factorisation, index, power, square root, cube root, algebra, variable, coefficient, term, expression, equation, formula, identity, inequality, simplify, expand, factorise, substitute, solve, subject of a formula and reasoning.

Pre-Requisite Knowledge
What have we already learned that will help us with this topic?

Students build upon their understanding of number, arithmetic procedures and algebra developed throughout Years 7 and 8.

Previous learning involving place value, calculation, factors, multiples, indices, expressions and linear equations provides the foundation for solving more sophisticated numerical and algebraic problems and applying mathematical reasoning with increasing confidence.

Pitch Up
How will we challenge ourselves?

Students are challenged through reasoning and problem-solving activities that require them to combine numerical and algebraic techniques to solve unfamiliar problems. They justify their methods, compare different approaches, identify efficient strategies and communicate mathematical reasoning using precise algebraic language.

Higher-attaining students are encouraged to make generalisations, manipulate increasingly complex algebraic expressions and solve multi-step equations involving several mathematical concepts.

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Wider Framework
How does this learning connect to future topics and bigger goals?

Number and algebra provide the foundation for almost every area of GCSE Mathematics. Secure understanding of these concepts supports future learning involving ratio and proportion, graphs, geometry, trigonometry, probability, statistics and mathematical proof.

Students develop the fluency and reasoning needed to solve increasingly sophisticated mathematical problems and apply mathematics confidently in a wide range of contexts.

Curriculum Hinterland
What wider knowledge will deepen our understanding of this topic?

Students deepen their understanding by recognising that number and algebra underpin many areas of science, technology, finance and engineering.

Algebra allows mathematicians to represent relationships, predict outcomes and model real-world situations, whilst secure number skills provide the accuracy and efficiency required to solve practical problems in everyday life.

Authentic connections
How does this topic connect to real life, careers, other subjects and important values?

Number and algebra are fundamental to many aspects of everyday life, from managing finances and interpreting data to modelling scientific relationships and solving engineering problems. Understanding mathematical relationships enables students to analyse information critically, make informed decisions and solve increasingly complex problems. SMSC is developed through resilience, logical reasoning and critical thinking as students justify solutions, evaluate different mathematical approaches and appreciate that complex problems can often be solved in more than one way.

Cross-curricular links include Science through formulae, calculations and scientific modelling, Computing through algorithms and programming logic, Business through financial modelling and budgeting, and Geography through data interpretation and proportional reasoning.

Students explore careers including:

- Cyber Security Analyst – applying algebraic reasoning and logical problem solving to protect digital systems.
- Artificial Intelligence Researcher – using mathematical models and algebra to develop intelligent technologies.
- Quantitative Analyst – applying advanced mathematical reasoning to analyse financial markets and manage risk.

The topic supports the Skills Builder Universal Framework, particularly:

- Problem Solving through applying numerical and algebraic techniques to unfamiliar mathematical situations.
- Speaking through explaining mathematical reasoning and justifying algebraic methods using precise vocabulary.
- Leadership through evaluating different approaches and confidently presenting mathematical solutions.

Resources
What books, websites, videos and materials will support our learning?

- Tutorial videos for all topics and interactive questions available at www.sparxmath.com

Assessment
How will we show what we know, remember and can apply?

Assessment includes questioning, class discussions, independent practice, problem-solving activities and recall of key vocabulary, methods and procedures relating to number and algebra. Students demonstrate their understanding by applying efficient

All students are provided with an account and set weekly homework by their teacher as well as being a tool on which to complete independent study as needed to close gaps from assessments ○ Tutorial videos and practice exam questions available at www.mathsgenie.co.uk ○ Tutorial videos, practice questions and practice exam questions available at www.corbettmaths.com	calculation methods, manipulating algebraic expressions, solving equations and inequalities, and explaining their reasoning using precise mathematical language. The assessment has been designed to assess both substantive mathematical knowledge (50%) and disciplinary mathematical knowledge (50%). Students demonstrate secure understanding of number and algebra whilst applying mathematical reasoning, selecting efficient strategies, communicating mathematical thinking clearly and solving unfamiliar mathematical problems.

Term 2 Topic	**Interpreting Data and Statistical Relationships**

Big Picture
What are the main ideas and big questions in this topic?

Students develop their understanding of how data can be collected, organised, represented and interpreted to answer questions about the world around them. They investigate how different statistical diagrams communicate information, recognising that selecting the most appropriate representation is essential for identifying patterns, trends and relationships accurately. Throughout the topic, students strengthen their confidence in interpreting statistical evidence by constructing and analysing tables, charts and graphs. They learn how statistical representations can be used to make predictions, identify relationships between variables and support informed decision making across a wide range of real-world contexts.

Students consider the following enquiry questions:

- How can data be collected and organised effectively?
- Which statistical diagrams best represent different types of data?
- How can graphs and charts help us identify patterns and trends?
- What relationships can be identified between different sets of data?
- How reliable are predictions based on statistical evidence?
- How can data help us make informed decisions?

Zoom In
What knowledge, skills and key vocabulary will we learn step by step?

Students begin by investigating how data can be collected, organised and represented. They design tables and data collection sheets, read and use data from tables, and organise information using two-way tables. Students then construct and interpret comparative bar charts, composite bar charts, line graphs and histograms, recognising how different diagrams communicate different types of information.

Building upon this understanding, students investigate time series graphs, interpreting changes over time and using observed trends to predict future outcomes. They then construct and interpret stem-and-leaf diagrams, back-to-back stem-and-leaf diagrams, pie charts and scatter graphs, before determining whether relationships exist between different sets of data. Students draw and interpret a line of best fit and use this to estimate and predict values within unfamiliar contexts.

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Students develop substantive knowledge by understanding how data can be collected and organised, recognising the strengths and limitations of different statistical diagrams, understanding the purpose of comparative and composite charts, interpreting scatter graphs and correlation, and recognising how statistical models can be used to make predictions. Alongside this, students strengthen their disciplinary knowledge by selecting appropriate methods of representation, constructing statistical diagrams accurately, interpreting trends and relationships, identifying correlation, evaluating the reliability of predictions, and communicating statistical reasoning using precise mathematical vocabulary.

Key vocabulary is introduced and revisited throughout the topic, including data, frequency, two-way table, comparative bar chart, composite bar chart, histogram, time series, trend, prediction, stem-and-leaf diagram, back-to-back stem-and-leaf diagram, pie chart, scatter graph, correlation, positive correlation, negative correlation, no correlation, line of best fit, estimate, interpret, analyse and relationship.

Pre-Requisite Knowledge
What have we already learned that will help us with this topic?

Students build upon their understanding of statistical representations, averages and graphs developed throughout Years 7 and 8. Previous learning involving frequency tables, bar charts, pie charts, line graphs and interpreting data provides the foundation for constructing more sophisticated statistical diagrams, identifying relationships between variables and making justified predictions from evidence.

Pitch Up
How will we challenge ourselves?

Students are challenged through reasoning and problem-solving activities that require them to interpret increasingly complex statistical information, justify the most appropriate methods of representation and evaluate the reliability of conclusions drawn from data. Students compare different graphical representations, identify misleading presentations of data and explain the reasoning behind their interpretations using precise mathematical language.

Wider Framework
How does this learning connect to future topics and bigger goals?

Understanding statistical representations and data analysis provides an important foundation for future GCSE learning involving variance, standard deviation, linear regression, correlation, binomial distributions, normal distributions and confidence intervals. Secure statistical reasoning enables students to evaluate evidence critically, recognise patterns within data and apply mathematical thinking confidently across a wide range of academic and real-world contexts.

Curriculum Hinterland
What wider knowledge will deepen our understanding of this topic?

Students deepen their understanding by recognising how statistics underpin decision making in science, healthcare, economics, sport, government and business. Collecting, analysing and interpreting data enables organisations to identify trends, test hypotheses and make evidence-based decisions, demonstrating why statistical literacy is an increasingly important skill in the modern world.

Authentic connections
How does this topic connect to real life, careers, other subjects and important values?

Statistics are used every day to understand information, identify trends and support decision making. From analysing climate data and scientific investigations to interpreting financial information and public health research, statistical reasoning helps people evaluate evidence and make informed judgements.
SMSC is developed through critical thinking, resilience and intellectual curiosity as students question evidence, evaluate the reliability of data and recognise that statistical information should always be interpreted carefully.

Cross-curricular links include Science through experimental investigations and graphing results, Geography through interpreting population, environmental and economic data, Computing through data handling and analysis, and Business through market research and financial trends.

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Students explore careers including:

- Intelligence Analyst – interpreting data and identifying patterns to support evidence-based decision making.
- Public Health Analyst – analysing population data to improve health outcomes and inform policy.
- Climate Data Scientist – interpreting environmental data to model climate patterns and predict future change.

The topic supports the Skills Builder Universal Framework, particularly:

- Listening through evaluating evidence and considering different interpretations of statistical information.
- Leadership through presenting evidence-based conclusions and justifying statistical decisions.
- Problem Solving through selecting appropriate statistical methods and interpreting unfamiliar data sets.

Resources What books, websites, videos and materials will support our learning?	**Assessment** How will we show what we know, remember and can apply?
○ Tutorial videos for all topics and interactive questions available at www.sparxmath.com All students are provided with an account and set weekly homework by their teacher as well as being a tool on which to complete independent study as needed to close gaps from assessments ○ Tutorial videos and practice exam questions available at www.mathsgenie.co.uk ○ Tutorial videos, practice questions and practice exam questions available at www.corbettmaths.com	Assessment includes questioning, class discussions, independent practice, problem-solving activities and recall of key vocabulary, statistical methods and graphical representations. Students demonstrate their understanding by constructing and interpreting tables, charts and graphs, identifying relationships within data, making justified predictions and explaining their reasoning using precise mathematical vocabulary. The assessment has been designed to assess both substantive mathematical knowledge (50%) and disciplinary mathematical knowledge (50%). Students demonstrate secure understanding of statistical representations and data analysis whilst applying mathematical reasoning, evaluating evidence critically, selecting appropriate methods and communicating justified conclusions.

Term 3
Topic

Fractions, Percentages and Financial Reasoning

Big Picture
What are the main ideas and big questions in this topic?

Students develop their understanding of fractions, decimals and percentages, recognising the relationships between these different representations of number and applying them to increasingly complex mathematical and real-life contexts. They investigate how fractions, decimals and percentages can be compared, converted and calculated accurately, strengthening their proportional reasoning and numerical fluency.

Alongside this, students explore financial mathematics, applying percentage change and simple interest to practical situations involving money and decision making. Through solving problems involving proportion, comparison and financial calculations, students develop the confidence to apply mathematical reasoning to everyday situations whilst preparing for more advanced proportional reasoning at GCSE.

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Throughout the topic, students consider the following enquiry questions:

- How are fractions, decimals and percentages connected?
- How can different numerical representations be compared and converted?
- How can fractions and percentages be used to solve real-life problems?
- Why are percentages important in financial mathematics?
- How can proportional reasoning help us make informed decisions?
- How can mathematical models describe change over time?

Zoom In

What knowledge, skills and key vocabulary will we learn step by step?

Students begin by developing their understanding of fractions. They investigate one quantity as a fraction of another, fractions of an amount, equivalent fractions, comparing and ordering fractions, improper fractions and mixed numbers, adding and subtracting fractions and mixed numbers, and multiplying and dividing fractions and mixed numbers. Throughout the topic, students strengthen their fluency with fractional calculations whilst recognising the relationships between different forms of representation.

Building upon this understanding, students investigate decimals and percentages by calculating one quantity as a percentage of another, converting fractions to decimals, including recurring decimals, converting percentages to fractions and decimals, ordering fractions, decimals and percentages, finding percentages of amounts, calculating percentage change and applying simple interest in financial contexts. Students develop confidence in selecting efficient methods and explaining the reasoning behind their calculations.

Students develop substantive knowledge by understanding fractions as representations of part-whole relationships, recognising the connections between fractions, decimals and percentages, understanding percentage change and simple interest, and applying appropriate calculation methods accurately across a range of numerical contexts. Alongside this, students strengthen their disciplinary knowledge by selecting efficient calculation methods, comparing and converting between different numerical representations, applying proportional reasoning to solve unfamiliar problems, interpreting percentage change in financial situations, explaining mathematical reasoning and communicating solutions using precise mathematical vocabulary.

Key vocabulary is introduced and revisited throughout the topic, including fraction, numerator, denominator, equivalent fraction, improper fraction, mixed number, decimal, recurring decimal, percentage, percentage change, percentage increase, percentage decrease, simple interest, proportion, compare, convert, multiplier, operator, calculate, estimate and reasoning.

Pre-Requisite Knowledge

What have we already learned that will help us with this topic?

Students build upon their understanding of the four operations, common factors, fractions as parts of a whole and percentages as the number of parts per hundred. Previous learning involving multiplication tables, number complements and proportional reasoning provides the foundation for comparing, converting and calculating with fractions, decimals and percentages in increasingly sophisticated mathematical contexts.

Pitch Up

How will we challenge ourselves?

Students are challenged through reasoning and problem-solving activities that extend beyond routine calculations. They solve problems involving fractions greater than one, percentages greater than 100%, reverse percentages, growth and decay, and adding and subtracting numbers in standard form. Students justify their methods, compare different approaches and apply proportional reasoning in unfamiliar mathematical and financial contexts.

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Wider Framework
How does this learning connect to future topics and bigger goals?

Understanding fractions, decimals and percentages provides a foundation for future learning involving ratio, direct and inverse proportion, limits of accuracy, graphical representations of proportion and rates of change. Students build the mathematical fluency needed to interpret multiplicative relationships, solve proportional problems and apply these concepts confidently throughout GCSE Mathematics.

Curriculum Hinterland
What wider knowledge will deepen our understanding of this topic?

Students deepen their understanding by recognising how fractions, percentages and proportional reasoning underpin finance, economics, science and engineering. Concepts such as percentage growth, interest, taxation and rates of change influence many aspects of everyday life, demonstrating how mathematical reasoning supports informed decision making within modern society.

Authentic connections
How does this topic connect to real life, careers, other subjects and important values?

Fractions, decimals and percentages are used every day when interpreting financial information, comparing prices, understanding taxation, calculating interest and analysing data. These concepts enable students to make informed decisions and appreciate the importance of mathematical reasoning in both personal and professional contexts. SMSC is developed through logical reasoning, resilience and financial awareness as students evaluate different methods, justify solutions and recognise the value of mathematics in supporting responsible decision making.

Cross-curricular links include Business Studies through taxation, profit and financial calculations, PSHE through personal finance and budgeting, Science through interpreting rates of change and experimental data, and Geography through analysing demographic and economic statistics.
Students explore careers including:

- Investment Banker – analysing percentage growth, financial performance and investment returns.
- Insurance Underwriter – calculating financial risk using percentages, probability and proportional reasoning.
- Food Technologist – applying proportions, percentages and measurements to develop and test food products.

The topic supports the Skills Builder Universal Framework, particularly:

- Planning through selecting efficient methods for multi-step financial and proportional calculations.
- Teamwork through discussing mathematical strategies and comparing different approaches to solving problems.
- Problem Solving through applying fractions, decimals and percentages in unfamiliar mathematical and real-life contexts.

Resources
What books, websites, videos and materials will support our learning?

- Tutorial videos for all topics and interactive questions available at www.sparxmath.com
  All students are provided with an account and set weekly homework by their teacher as well as being a tool on which to complete independent study as needed to close gaps from assessments

Assessment
How will we show what we know, remember and can apply?

Assessment includes questioning, class discussions, independent practice, problem-solving activities and recall of key vocabulary, methods and procedures relating to fractions, decimals, percentages and financial mathematics. Students demonstrate their understanding by comparing and converting between different numerical representations, completing accurate calculations, solving percentage and proportion

○ Tutorial videos and practice exam questions available at www.mathsgenie.co.uk ○ Tutorial videos, practice questions and practice exam questions available at www.corbettmaths.com	problems, and applying their knowledge in increasingly challenging mathematical and real-life contexts. The assessment has been designed to assess both substantive mathematical knowledge (50%) and disciplinary mathematical knowledge (50%). Students demonstrate secure understanding of fractions, decimals, percentages and proportional reasoning whilst applying mathematical reasoning, selecting efficient strategies, communicating their thinking clearly and solving unfamiliar mathematical problems.

Term 4
Topic

Reasoning with Geometry and Algebra

Big Picture
What are the main ideas and big questions in this topic?

Students develop increasingly sophisticated mathematical reasoning by applying geometry and algebra to solve complex problems. Foundation students strengthen their understanding of angles, Pythagoras' Theorem and trigonometry, applying geometric relationships to calculate missing lengths and angles in both two-dimensional and three-dimensional contexts. Higher students extend their understanding of equations, inequalities, formulae and sequences, using algebraic methods to represent patterns, model relationships and solve increasingly challenging mathematical problems.

Throughout the topic, students develop confidence in selecting efficient mathematical strategies, communicating logical reasoning and recognising how geometry and algebra provide powerful tools for modelling and solving real-world problems.

Students consider the following enquiry questions:

- How can mathematical relationships help us solve increasingly complex problems?
- How do angles and trigonometry help us measure and understand the world?
- Why are equations and inequalities useful for modelling real-life situations?
- How can patterns and sequences be represented mathematically?
- How can algebra and geometry work together to solve unfamiliar problems?
- Why is mathematical reasoning more important than simply finding the answer?

Zoom In
What knowledge, skills and key vocabulary will we learn step by step?

Foundation Pathway: Students investigate angles by calculating angles in triangles, parallel lines and polygons, applying established angle rules to solve increasingly complex geometric problems. They then explore Pythagoras' Theorem in both two-dimensional and three-dimensional shapes, before using trigonometry to calculate missing sides and angles in right-angled triangles. Students also recall and apply exact trigonometric values to solve a range of mathematical problems involving shape and space.

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Students develop substantive knowledge by understanding angle relationships within geometric figures, recognising how Pythagoras' Theorem describes relationships between the sides of right-angled triangles, understanding the trigonometric ratios and recognising when different geometric methods should be applied.
Their disciplinary knowledge is strengthened through selecting appropriate geometric techniques, applying angle rules accurately, solving multi-step geometric problems, interpreting diagrams, reasoning mathematically and communicating solutions using precise mathematical vocabulary.

Higher Pathway: Students develop increasingly sophisticated algebraic reasoning by solving equations, rearranging formulae, solving and using inequalities, and investigating both linear and geometric sequences. They apply algebraic methods to represent patterns, generalise relationships and solve increasingly complex mathematical problems involving real-life contexts.

Students develop substantive knowledge by understanding how equations, inequalities and formulae represent mathematical relationships, recognising the structure of linear and geometric sequences, and understanding how algebra can model change and generalise patterns. Alongside this, students strengthen their disciplinary knowledge by selecting appropriate algebraic methods, manipulating expressions accurately, solving equations logically, identifying patterns within sequences, forming mathematical generalisations and communicating algebraic reasoning using precise mathematical language.

Key vocabulary is introduced and revisited throughout the topic, including triangle, polygon, parallel lines, angle, Pythagoras' Theorem, hypotenuse, trigonometry, sine, cosine, tangent, exact values, equation, inequality, formula, rearrange, sequence, linear sequence, geometric sequence, nth term, pattern, variable, solve, generalise and reasoning.

Pre-Requisite Knowledge
What have we already learned that will help us with this topic?

Students build upon their understanding of algebra, angle properties, polygons, constructions and graphical representations developed throughout Years 7 and 8.

Previous learning involving inverse operations, function machines, expanding brackets, solving one-step and two-step equations and substituting into expressions provides the foundation for applying increasingly sophisticated algebraic and geometric reasoning.

Pitch Up
How will we challenge ourselves?

Students are challenged through reasoning and investigative activities that move beyond routine procedures. Higher students create equations from given solutions, solve and represent inequalities on number lines, investigate compound inequalities and explore arithmetic, quadratic and geometric sequences by identifying general rules and modelling real-life situations. Foundation students apply Pythagoras' Theorem and trigonometry in increasingly complex contexts, solving multi-step geometric problems and justifying their reasoning.

Across both pathways, students investigate patterns, explain mathematical relationships, complete "spot the mistake" activities and solve multi-step mathematical mysteries that combine different areas of mathematics.

Wider Framework
How does this learning connect to future topics and bigger goals?

Foundation students develop the geometric reasoning required for future work involving simultaneous equations, coordinate geometry and advanced problem solving.

Curriculum Hinterland
What wider knowledge will deepen our understanding of this topic?

Students deepen their understanding by recognising how algebra and geometry work together to describe and model the world around them. Mathematical relationships underpin developments in engineering, architecture, computing, robotics and scientific

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Higher students build the algebraic foundations needed for sine and cosine rules, advanced trigonometry, three-dimensional trigonometry, mathematical proof and further algebraic modelling. Across both pathways, students strengthen the logical reasoning and mathematical fluency required for success at GCSE and beyond.	research, demonstrating how precise reasoning enables people to design, predict and solve increasingly complex problems.

Authentic connections

How does this topic connect to real life, careers, other subjects and important values?

Geometry and algebra underpin many aspects of modern life, from designing buildings and aircraft to programming autonomous robots and analysing financial systems. Understanding mathematical relationships enables students to interpret information, solve practical problems and make evidence-based decisions across a wide range of contexts. SMSC is developed through resilience, logical reasoning and perseverance as students justify mathematical conclusions, evaluate different methods and appreciate that complex problems often have multiple valid solution strategies.

Cross-curricular links include Art and Design through technical drawing and perspective, Science through forces, vectors and formulae, Computing through algorithms and programming logic, and Design Technology through engineering and construction.

Students explore careers including:

- Structural Engineer – applying trigonometry, geometry and algebra to design safe buildings and bridges.
- Robotics Engineer – using equations, sequences and trigonometry to programme intelligent robotic systems.
- Satellite Navigation Specialist – applying geometry, angles and mathematical modelling to develop global positioning systems.

The topic supports the Skills Builder Universal Framework, particularly:

- Leadership through presenting mathematical reasoning and evaluating alternative approaches.
- Creativity through modelling patterns, investigating relationships and solving unfamiliar problems.
- Problem Solving through selecting appropriate algebraic and geometric techniques to solve increasingly complex mathematical situations.

Resources

What books, websites, videos and materials will support our learning?

- Tutorial videos for all topics and interactive questions available at www.sparxmath.com
  All students are provided with an account and set weekly homework by their teacher as well as being a tool on which to complete independent study as needed to close gaps from assessments
- Tutorial videos and practice exam questions available at www.mathsgenie.co.uk

Assessment

How will we show what we know, remember and can apply?

Assessment includes questioning, class discussions, independent practice, problem-solving activities and recall of key vocabulary, methods and mathematical procedures relating to geometry, trigonometry and algebra. Students demonstrate their understanding by applying angle rules, Pythagoras' Theorem, trigonometric methods, equations, inequalities and sequences to solve increasingly challenging mathematical problems whilst communicating their reasoning using precise mathematical language.

○ Tutorial videos, practice questions and practice exam questions available at www.corbettmaths.com	The assessment has been designed to assess both substantive mathematical knowledge (50%) and disciplinary mathematical knowledge (50%). Students demonstrate secure understanding of geometric and algebraic relationships whilst applying mathematical reasoning, selecting efficient strategies, justifying conclusions and solving unfamiliar mathematical problems.

Term 5
Topic/Theme/Enquiry

Analysing Shape, Data and Graphical Relationships

Big Picture
What are the main ideas and big questions in this topic?

Students develop their understanding of how mathematical relationships can be represented, analysed and interpreted through geometry, statistics and graphs. Foundation students strengthen their geometric reasoning by applying angle rules within triangles, quadrilaterals, parallel lines and polygons before using statistical measures to compare and interpret data. Higher students investigate increasingly sophisticated graphical representations, learning how different graphs model relationships, change and real-life situations.
Throughout the topic, students strengthen their ability to interpret mathematical information, identify patterns and communicate evidence-based conclusions. Whether reasoning about angles, comparing statistical data or analysing graphs, students develop the confidence to solve problems using mathematical evidence and logical thinking.

Students consider the following enquiry questions:

- How do geometric rules help us solve problems involving shape and space?
- How can averages help us compare and interpret data?
- What can graphs tell us about relationships between variables?
- How do mathematical models help explain real-world situations?
- How can different mathematical representations be used to solve problems?
- Why is interpreting information as important as calculating it?

Zoom In
What knowledge, skills and key vocabulary will we learn step by step?

Foundation Pathway: Students begin by developing their understanding of geometric angle relationships, applying rules involving angles in triangles and quadrilaterals, angles on parallel lines, and interior and exterior angles of polygons. They use established angle properties to solve increasingly complex geometric problems and justify their reasoning using precise mathematical language.

Building upon this understanding, students investigate statistics, calculating averages from raw data and frequency tables before comparing data sets using the mean, median, mode and range. Students interpret statistical information, identify patterns within data and use appropriate measures of average to draw justified conclusions.

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Students develop substantive knowledge by understanding angle relationships within geometric figures, recognising the properties of polygons, understanding the purpose of statistical averages and knowing when different measures of average are most appropriate.
Their disciplinary knowledge is strengthened by applying geometric reasoning, selecting appropriate statistical methods, comparing data sets critically, interpreting evidence, communicating mathematical conclusions and solving increasingly complex problems involving geometry and statistics.

Higher Pathway: Students develop increasingly sophisticated graphical reasoning by investigating linear, quadratic, cubic and circular graphs, before interpreting distance-time graphs, velocity-time graphs and a range of real-life graphs. They analyse relationships between variables, identify patterns within graphical representations and apply graphical methods to solve practical mathematical problems.

Students develop substantive knowledge by understanding how different graphs represent mathematical relationships, recognising the characteristics of linear, quadratic, cubic and circular graphs, and understanding how graphical models describe movement and change.
Alongside this, students strengthen their disciplinary knowledge by interpreting graphical information accurately, comparing relationships between variables, analysing rates of change, selecting appropriate graphical methods and communicating mathematical reasoning using precise vocabulary.

Key vocabulary is introduced and revisited throughout the topic, including triangle, quadrilateral, polygon, interior angle, exterior angle, parallel lines, average, mean, median, mode, range, frequency table, compare, data, graph, linear, quadratic, cubic, circle, gradient, intercept, distance-time graph, velocity-time graph, relationship, interpret, analyse and reasoning.

Pre-Requisite Knowledge
What have we already learned that will help us with this topic?

Students build upon their understanding of angle properties, polygons, symmetry, averages and graphical representations developed throughout Years 7 and 8.

Previous learning involving parallel and perpendicular lines, quadrilateral angle sums, linear graphs, gradients, intercepts, rearranging equations and interpreting graphical information provides the foundation for applying increasingly sophisticated geometric, statistical and graphical reasoning.

Pitch Up
How will we challenge ourselves?

Students are challenged through reasoning and investigative activities that require them to combine geometric, statistical and graphical knowledge to solve unfamiliar problems.
Foundation students justify angle calculations and evaluate which statistical measures provide the most meaningful comparisons.
Higher students interpret increasingly complex graphs, analyse relationships between variables and explain how graphical models represent real-life situations. Across both pathways, students compare methods, evaluate evidence and communicate mathematical reasoning clearly.

Wider Framework
How does this learning connect to future topics and bigger goals?

Foundation students strengthen the geometric and statistical reasoning required for future work involving probability, trigonometry and statistical analysis. Higher students develop the graphical fluency needed for advanced algebra, calculus, modelling and mathematical interpretation at GCSE and beyond. Across both

Curriculum Hinterland
What wider knowledge will deepen our understanding of this topic?

Students deepen their understanding by recognising how geometry, statistics and graphs are used to model, interpret and explain the world around them. From analysing scientific investigations to designing buildings and interpreting financial trends, mathematical representations allow people to make informed decisions based on evidence, patterns and logical reasoning.

pathways, students continue to develop the analytical thinking required to solve increasingly sophisticated mathematical problems.

Authentic connections

How does this topic connect to real life, careers, other subjects and important values?

Angles, statistics and graphs are used across many aspects of everyday life, from interpreting health data and analysing sporting performance to designing structures and monitoring transport systems. Understanding how mathematical information is represented enables students to evaluate evidence critically and make informed decisions. SMSC is developed through resilience, critical thinking and logical reasoning as students interpret evidence, justify mathematical conclusions and appreciate that different representations can communicate information in different ways.

Cross-curricular links include Science through experimental data and motion graphs, Geography through population and environmental data, Business through market trends and financial analysis, and Design Technology through measurement and geometric design.

Students explore careers including:

- Transport Planner – using graphs and statistical data to improve transport systems and predict traffic flows.
- Clinical Research Scientist – analysing statistical evidence and interpreting data from medical investigations.
- Geospatial Information Systems (GIS) Specialist – using mapping, geometry and graphical data to analyse landscapes and support planning.

The topic supports the Skills Builder Universal Framework, particularly:

- Listening through evaluating evidence and interpreting mathematical information from different representations.
- Creativity through selecting appropriate mathematical models and representations to solve problems.
- Problem Solving through applying geometric, statistical and graphical reasoning to unfamiliar mathematical and real-world contexts.

Resources

What books, websites, videos and materials will support our learning?

- Tutorial videos for all topics and interactive questions available at www.sparxmath.com
  All students are provided with an account and set weekly homework by their teacher as well as being a tool on which to complete independent study as needed to close gaps from assessments
- Tutorial videos and practice exam questions available at www.mathsgenie.co.uk
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Assessment

How will we show what we know, remember and can apply?

Assessment includes questioning, class discussions, independent practice, problem-solving activities and recall of key vocabulary, methods and mathematical procedures relating to geometry, statistics and graphs. Students demonstrate their understanding by applying angle rules, calculating and comparing averages, interpreting graphs accurately and explaining their reasoning using precise mathematical vocabulary. The assessment has been designed to assess both substantive mathematical knowledge (50%) and disciplinary mathematical knowledge (50%). Students demonstrate secure understanding of geometric relationships, statistical measures and graphical representations whilst applying mathematical reasoning, interpreting

	evidence critically, selecting appropriate strategies and solving unfamiliar mathematical problems.

Term 6 Topic		**Measurement, Accuracy and Mathematical Modelling**

Big Picture
What are the main ideas and big questions in this topic?

Students develop their understanding of mensuration by applying mathematical formulae to calculate the area, perimeter, surface area and volume of an increasingly wide range of two-dimensional and three-dimensional shapes. Foundation students strengthen their understanding of area, surface area and volume using cuboids and prisms, whilst Higher students extend this knowledge to circles, cones, spheres and pyramids, applying mathematical reasoning to increasingly sophisticated geometric problems. Alongside this, students develop their understanding of accuracy and error, recognising that measurements are rarely exact and that mathematical models must account for uncertainty. Through solving practical problems involving measurement, volume and bounds, students appreciate how mathematics is used to design, build and evaluate solutions within real-world contexts.

Students consider the following enquiry questions:

- How can mathematical formulae help us measure the world accurately?
- Why are area, volume and surface area important in real-life situations?
- How can mathematical models describe three-dimensional space?
- Why is accuracy important when making measurements?
- How can error intervals and bounds improve the reliability of calculations?
- How do mathematicians use measurement to solve practical problems?

Zoom In
What knowledge, skills and key vocabulary will we learn step by step?

Foundation Pathway
Students develop their understanding of mensuration by calculating the area of two-dimensional shapes, before applying formulae to calculate the volume and surface area of cuboids and prisms. Throughout the topic, students interpret dimensions accurately, select appropriate mathematical methods and apply formulae to solve practical problems involving measurement and spatial reasoning.

Students develop substantive knowledge by understanding the relationships between length, area, surface area and volume, recognising the properties of common two-dimensional and three-dimensional shapes, understanding the formulae required for calculating area, surface area and volume, and recognising how measurement is applied in practical contexts. Their disciplinary knowledge is strengthened through selecting appropriate formulae, interpreting dimensions accurately, solving multi-step measurement problems, applying mathematical reasoning to unfamiliar situations and communicating solutions using precise mathematical vocabulary.

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Higher Pathway

Students extend their understanding of mensuration by calculating the area and circumference of circles, before applying formulae to determine the volume and surface area of cuboids, prisms, cones, spheres and pyramids. They then investigate error intervals and calculating area using bounds, recognising how measurement uncertainty influences mathematical calculations and practical decision making.

Students develop substantive knowledge by understanding the formulae associated with increasingly complex three-dimensional shapes, recognising the significance of π in circular measurement, understanding the purpose of error intervals and bounds, and appreciating how mathematical models describe physical space. Alongside this, students strengthen their disciplinary knowledge by applying formulae accurately, selecting appropriate methods for solving complex mensuration problems, interpreting measurement accuracy, reasoning mathematically about limits of accuracy and communicating mathematical conclusions using precise technical vocabulary.

Key vocabulary is introduced and revisited throughout the topic, including area, perimeter, circumference, volume, surface area, prism, cuboid, cone, sphere, pyramid, radius, diameter, π, formula, dimensions, units, square units, cubic units, accuracy, error interval, bounds, estimate, measure and reasoning.

Pre-Requisite Knowledge
What have we already learned that will help us with this topic?

Students build upon their understanding of perimeter, area, volume, circles, Pythagoras' Theorem, algebraic manipulation and measurement developed throughout Years 7–9. Previous learning involving converting units, solving equations, calculating surface area and volume, interpreting inequalities and applying formulae provides the foundation for solving increasingly sophisticated mensuration and accuracy problems.

Pitch Up
How will we challenge ourselves?

Students are challenged through reasoning and investigative activities that require them to combine multiple areas of mathematics to solve unfamiliar measurement problems. Foundation students apply area and volume formulae within increasingly complex contexts, whilst Higher students investigate composite solids, solve problems involving spheres and pyramids, calculate using bounds and evaluate the effect of measurement accuracy on mathematical solutions.
Across both pathways, students justify their methods, compare alternative strategies and explain why particular mathematical models are appropriate.

Wider Framework
How does this learning connect to future topics and bigger goals?

Foundation students strengthen the measurement skills required for further work involving geometry, trigonometry and practical problem solving. Higher students develop the mathematical reasoning required for similarity, advanced mensuration, calculus and mathematical modelling. Across both pathways, students build the confidence to apply mathematical formulae accurately, evaluate the reliability of results and solve increasingly sophisticated real-world problems..

Curriculum Hinterland
What wider knowledge will deepen our understanding of this topic?

Students deepen their understanding by exploring how geometry has developed throughout history, from the discoveries of Pythagoras and Euclid to modern approaches for calculating π with increasing accuracy. They consider why different measurement systems have evolved and how mathematical reasoning underpins developments in science, engineering, architecture and technology. Recognising the historical development of mathematical ideas helps students appreciate that mathematics is a continually evolving discipline used to understand and shape the world around us.

Authentic connections
How does this topic connect to real life, careers, other subjects and important values?

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Measurement, area, volume and accuracy underpin many aspects of modern life, from designing buildings and manufacturing products to planning transport systems and developing scientific research. Understanding how mathematical models describe physical space enables students to solve practical problems and appreciate the importance of precision in professional settings. SMSC is developed through resilience, precision and logical reasoning as students evaluate measurement accuracy, justify mathematical conclusions and recognise the importance of reliable evidence when solving practical problems.

Cross-curricular links include Science through formulae, measurement and experimental accuracy, Geography through spatial data and mapping, Art and Design through technical drawing, scale and tessellation, and Design Technology through product design and manufacturing.

Students explore careers including:

- Biomedical Engineer – designing medical equipment using accurate measurements, volume calculations and mathematical modelling.
- Environmental Engineer – calculating capacity, drainage, land area and resource management using geometric reasoning.
- Industrial Designer – applying area, surface area and volume to design efficient products, packaging and manufacturing processes.

The topic supports the Skills Builder Universal Framework, particularly:

- Planning through selecting appropriate mathematical methods and formulae for complex measurement problems.
- Creativity through modelling three-dimensional objects and solving practical design challenges.
- Problem Solving through applying mensuration, accuracy and bounds in unfamiliar mathematical and real-world contexts.

Resources What books, websites, videos and materials will support our learning?	**Assessment** How will we show what we know, remember and can apply?
○ Tutorial videos for all topics and interactive questions available at www.sparxmath.com All students are provided with an account and set weekly homework by their teacher as well as being a tool on which to complete independent study as needed to close gaps from assessments ○ Tutorial videos and practice exam questions available at www.mathsgenie.co.uk ○ Tutorial videos, practice questions and practice exam questions available at www.corbettmaths.com	Assessment includes questioning, class discussions, independent practice, problem-solving activities and recall of key vocabulary, methods and mathematical formulae relating to mensuration and accuracy. Students demonstrate their understanding by calculating area, perimeter, surface area and volume accurately, applying mathematical reasoning to solve practical measurement problems, interpreting error intervals and bounds, and communicating their thinking using precise mathematical vocabulary. The assessment has been designed to assess both substantive mathematical knowledge (50%) and disciplinary mathematical knowledge (50%). Students demonstrate secure understanding of measurement, mensuration and mathematical accuracy whilst applying logical reasoning, selecting efficient strategies, evaluating the reliability of results and solving unfamiliar mathematical problems.