

IDSALL SCHOOL

Maths Curriculum

Our Vision for Maths:

Mathematics is a creative discipline with a rich history of exploring and solving intriguing problems; it provides a foundation for understanding the world and is instrumental in ground-breaking work which drives global innovations.

- Through our mathematics curriculum, our vision is to harness each student's love and enjoyment of the subject by allowing them frequent opportunities to develop their understanding and succeed. We aim to develop learners who enjoy mathematics and are curious about the subject and its applications. Our students will be fluent in the fundamentals of mathematics and develop sophisticated problem-solving skills which allow them to explore challenging questions with confidence.
- We will develop student's ability to think logically and accurately.
- We enable students to be able to confidently solve problems in unfamiliar contexts and demonstrate their ability to communicate ideas fluently.
- Students will be provided with skills that will not only help them succeed in mathematics but also in other subjects as well as outside the classroom.
- Opportunities for self-reflection are embedded in all key stages, enabling our students to take increasing ownership of their learning and ultimately creating independent learners who are well-equipped for the next phase of their education.



The Big Picture - Intent:

Y7 Mathematics is an exciting transition point for students. Students develop their learning from primary using a ‘mastery’ approach alongside traditional methods to aid deeper understanding, competence and confidence in their mathematics.

Each term is split into 2 parts with a common theme, then split into further blocks that ensure students spend enough time to get a deep understanding of the topic covered. Blocks have been designed with interleaving as a key element enabling students to revisit previous work, develop knowledge and understanding and further extend their skills. Number work is emphasised throughout the blocks alongside estimation. Calculator skills have been incorporated throughout the curriculum, thus enabling all students to access the materials presented.

All students will be able to access the main content of all lessons and all students will be taught to the top with scaffolding, adaptive teaching and stretch and challenge provided where necessary.

Implementation:

There will be 7 blocks of approx. 6 weeks each. Each lesson will involve a retrieval starter usually a Mathsbox WR skills task or a WR flashback 4.

Independence and study skills will be fostered through challenging questions and problems, modelling, deep thinking and homework. All students will receive a PLC after each end of unit and termly assessment.

Lessons will be based around multiple representations; Concrete, Pictorial, Abstract to give a deeper understanding of concepts. Reasoning will be developed through the exploration of mathematical patterns and images with a variety of problem-solving methods for just one question.

Learning to move forward and uncover mathematical ideas from mistakes and misconceptions via true/false, spot the mistake and other reasoning tasks where students are required to make a judgement and justify their answers. A knowledge organiser will be provided for each block to enable students to recall keywords, facts, formulas and/or formal methods.

Students will be given opportunities for awe and wonder where they are able to break down a barrier they had previously and encounter wow moments about the things they are learning.

Numeracy and calculator skills will be embedded throughout the curriculum.

Key Summative Assessments:

One formal assessment every term which comprises of 2 papers.

Shorter end of unit assessments after each unit.

DFM and Mathwatch Retrieval homework.

Live marking and low stakes quizzing

Autumn Term Assessments

Algebraic Thinking
Place Value and Proportion

Spring Term Assessments

Applications of Number
Directed Number
Fractional thinking

Summer term Assessments

Lines and Angles
Reasoning with number

Impact:

Students will have increased understanding and confidence in Maths and be able to apply new skills to a variety of new and challenging mathematical problems.

Students will know more and remember more.

There will be an increase in attainment, evidenced in regular, formal and interleaved assessments.

<p>Content</p>	<p>Disciplinary Knowledge (Skills) This is the actions taken within a topic to gain substantive knowledge</p>	<p>Substantive Knowledge This is the specific, factual content for the topic, which is connected into a careful sequence of learning.</p>	<p>Prior Learning (Y6)</p>	<p>Future learning (Y8)</p>
<ul style="list-style-type: none"> • Sequences • Algebraic notation • Equality and equivalence • Place value. • Fraction, decimal and percentage. • Solving problems with the four operations. • Directed numbers • Geometric notation and reasoning. • Developing number sense. • Sets and probability. • Prime numbers and proof. 	<ul style="list-style-type: none"> • Continue linear and non-linear sequences. • Use fact families to help form and solve one step equations. • Round numbers to positive powers of 10 and one sig fig. • Convert between FDP for multiples of 10% and 25%. • Solve problems involving addition in the context of perimeter, money and frequency trees/tables. • Find the HCF/LCM of numbers. • Calculate the area of standard shapes. • Calculate with negative numbers. • Solve equations. • Construct triangles using a compass and protractor. • Draw parallel and perpendicular lines. • Calculate missing angles. • Do calculations mentally. • Draw and interpret Venn diagrams. • Calculate the probability of a single event. • Express a number as a product of its prime factors. 	<ul style="list-style-type: none"> • What linear and non-linear means. • What equality means • Why we round numbers. • About Fraction, Decimal and Percentage (FDP) equivalence and how the three forms connect. • Appropriate methods for addition and how to apply this to various contexts. • What the Highest Common Factor (HCF) and Lowest Common Multiple (LCM) is. • What area means and how we can connect formulae to find area of standard shapes. • How to carry out the four operations with negative numbers. • How to use inverse operations to solve simple equations. • What parallel and perpendicular means. • Know the names and properties of a range of shapes and angle types. • Know the sum of probabilities of an event is 1. • Know prime, square and triangular numbers. 	<ul style="list-style-type: none"> • Describe and generate a linear number sequence. • Express missing numbers algebraically. • Use simple formulae. • Operations on fractions including different denominators. • Read, write and compare numbers up to 10000000 and determine the value of each digit. • X and divide up to 4 digits by a 2 digit number. • Use negative numbers in context. • Describe the properties of shapes. 	<ul style="list-style-type: none"> • Multiply and divide fractions and integers. • The reciprocal. • Ratio and proportion connects to Y7 algebra, area and fractions. • Cartesian plane unit in y8 connects to Y7 unit on equations and directed numbers. • Fractions and percentages in y8 connects to Y7 units on FDP, and the 4 operations. • Geometry units in y8 connect to equations and properties of shapes. • Data units in Y8 link to finding the range and algebraic substitution.

The Big Picture - Intent:

During Y8, students revisit prior topics within new contexts as well as further developing their mathematical thinking and skills. They will develop their learning using a ‘mastery’ approach alongside traditional methods to aid deeper understanding, competence and confidence. Learning blocks to be covered: Proportional Reasoning, Representations, Algebraic techniques, Developing number, Developing geometry and Reasoning with data.

Each term is split into two halves with a common theme, each half is split into further blocks that ensure students spend enough time to get a deep understanding of the topic covered. Blocks have been designed with interleaving as a key element enabling students to revisit previous work, develop knowledge and understanding and further extend their skills.

Number work is emphasised throughout the blocks alongside estimation. Calculator skills have been incorporated throughout the curriculum, thus enabling all students to access the materials presented.

All students will be able to access the main content of all lessons and all students will be taught to the top with scaffolding, adaptive teaching and stretch and challenge provided where necessary.

Implementation:

There will be 6 blocks of approx. 6 weeks each. Each lesson will involve a retrieval starter usually a Mathsbox WR skills task or a WR flashback 4.

Independence and study skills will be fostered through challenging questions and problems, modelling, deep thinking and homework. All students will receive a PLC after each end of unit and termly assessment.

Lessons will be based around multiple representations; Concrete, Pictorial, Abstract to give a deeper understanding of concepts. Reasoning will be developed through the exploration of mathematical patterns and images with a variety of problem-solving methods for just one question.

Learning to move forward and uncover mathematical ideas from mistakes and misconceptions via true/false, spot the mistake and other reasoning tasks where students are required to make a judgement and justify their answers.

A knowledge organiser will be provided for each block to enable students to recall keywords, facts, formulas and/or formal methods.

Students will be given opportunities for awe and wonder where they are able to break down a barrier they had previously and encounter wow moments about the things they are learning.

Numeracy and calculator skills will be embedded.

Key Summative Assessments:

One formal assessment every term which comprises of 2 papers.

Shorter end of unit assessments after each unit.

DFM and Mathwatch Retrieval homework.

Live marking and low stakes quizzing

Autumn Term Assessments

Proportional Reasoning
Representations

Spring Term Assessments

Algebraic Techniques
Developing Number

Summer term Assessments

Lines and Angles
Reasoning with number

Impact:

Students will have increased understanding and confidence in Maths and be able to apply new skills to a variety of new and challenging mathematical problems. Students will know more and remember more. There will be an increase in attainment, evidenced in regular, formal and interleaved assessments.

Content/Units	Disciplinary Knowledge (Skills) This is the actions taken within a topic to gain substantive knowledge.	Substantive Knowledge This is the specific, factual content for the topic, which is connected into a careful sequence of learning.	Prior Learning	Future learning (Y9)
<ul style="list-style-type: none"> • Ratio multiplicative relationships. • Multiplying and dividing fractions. • Cartesian plane. • Representing data. • Tables and probability. • Algebraic manipulation. • Sequences • Indices • Fractions and percentages. • Angles. • Area of 2D shapes • Symmetry and reflection. • Data handling cycle. • Measures of location. 	<ul style="list-style-type: none"> • Write two or more things as a ratio. • Simplify ratios • Calculate the circumference of a circle. • Find scale factors and use them to solve simple problems. • Use conversion graphs. • Multiply and divide integers and fractions. • Plot and recognise different straight-line graphs. • Plot and interpret scatter graphs. • Expand brackets. • Write numbers in standard form. • Find missing angles explaining what rules you used. • Find the area of trapeziums, circles and parts of circles. • Calculate the three means from a list of values. • Find the mean for grouped data. 	<ul style="list-style-type: none"> • That a ratio represents the relationship between parts. • That direct proportion represents a multiplicative relationship that can be applied to many contexts. • That dividing is the same as multiplying by the reciprocal. • Why $y = a$ lines are horizontal and $x = b$ lines are vertical. • directly proportional graphs have the equation $y = kx$. • How to represent bivariate data in a graph and how we can use this to estimate. • What brackets represent in algebra. • The difference between an equation, an expression, a formulae and an identity. • Why we use standard form and the format that it takes. • The rules for angles in parallel lines and polygons. • How to find the area of a trapezium and a circle. • What a primary and secondary data source is. • The three types of average and their positives and limitations. 	<ul style="list-style-type: none"> • Converting units and multiplicative relationships facts. • Simple \times and \div of fractions • Describe the full coordinate grid • Solve problems with line and bar charts and construct and interpret pie charts. • Sets and Probability unit • Numerous algebra blocks Sequences unit 1. • Powers and roots are within initial algebra units and in final unit on prime numbers and proof. • Build on FDP unit. • Angles work build upon block on Developing geometric reasoning. • Draw, translate and reflect simple shapes in the axis • Measures of location builds upon y7 work where students found the mean, median and range. 	<ul style="list-style-type: none"> • Revisit scale drawings • Revisit conversion graphs. • Direct and inverse proportion problems. • Fraction, decimal percentage understanding is revisited and extended into Y9 within different contexts. • Cartesian plane block connect to Y9 straight line graphs and algebraic representation blocks. • Unit in y8 connects to Y9 unit Probability where experimental and theoretical probability is introduced. • First 3 blocks in Y9 interleave algebraic manipulation in the blocks context. • Y9 unit testing conjectures links to previous sequences work. • Indices is revisited and interleaved in Y9 but then further developed in Y10. • Angles work is included with increased reasoning in the Y9 Deduction unit. • Area is developed into surface area and volumes of 3D shapes in Autumn Y9. • Measures of location is interleaved and revised in Y9 but developed further in Y10.

The Big Picture - Intent:

Y9 Mathematics continues to revisit topics within new contexts whilst extending and further developing mathematical thinking and skills. There is an increased focus on students' rationale and thinking behind the maths that they are doing. Students develop their learning from previous years using a 'mastery' approach alongside traditional methods to aid deeper understanding, competence and confidence.

Learning Programme blocks to be covered: Reasoning with algebra, Constructing in 2 and 3 dimensions, Reasoning with number, Reasoning with geometry, Reasoning with proportion, Representations.

Each term is split into two halves with a common theme, each half is split into further blocks that ensure students spend enough time to get a deep understanding of the topic covered. Blocks have been designed with interleaving as a key element enabling students to revisit previous work, develop knowledge and understanding and further extend their skills.

Number work is emphasised throughout the blocks alongside estimation.

Calculator skills have been incorporated throughout the curriculum, thus enabling all students to access the materials presented.

All students will be able to access the main content of all lessons and all students will be taught to the top with scaffolding, adaptive teaching and stretch and challenge provided where necessary.

Implementation:

There will be 6 blocks of approx. 6 weeks each. Each lesson will involve a retrieval starter usually a Mathsbox WR skills task or a WR flashback 4.

Independence and study skills will be fostered through challenging questions and problems, modelling, deep thinking and homework. All students will receive a PLC after each end of unit and termly assessment.

Lessons will be based around multiple representations; Concrete, Pictorial, Abstract to give a deeper understanding of concepts. Reasoning will be developed through the exploration of mathematical patterns and images with a variety of problem-solving methods for just one question.

Learning to move forward and uncover mathematical ideas from mistakes and misconceptions via true/false, spot the mistake and other reasoning tasks where students are required to make a judgement and justify their answers.

A knowledge organiser will be provided for each block to enable students to recall keywords, facts, formulas and/or formal methods.

Students will be given opportunities for awe and wonder where they are able to break down a barrier they had previously and encounter wow moments about the things they are learning.

Numeracy and calculator skills will be embedded.

Key Summative Assessments:

One formal assessment every term which comprises of 2 papers.

Shorter end of unit assessments after each unit.

DFM and Mathwatch Retrieval homework.

Live marking and low stakes quizzing

Autumn Term

Reasoning with Algebra
Constructing in 2 and 3 dimensions

Spring Term

Reasoning with Number
Reasoning with Geometry

Summer term

Reasoning with proportion
Representations
End of year Assessment.

Impact:

Students will have increased understanding and confidence in Maths and be able to apply new skills to a variety of new and challenging mathematical problems. Students will know more and remember more. There will be an increase in attainment, evidenced in regular, formal and interleaved assessments.

Content	Disciplinary Knowledge (Skills) This is the actions taken within a topic to gain substantive knowledge	Substantive Knowledge This is the specific, factual content for the topic, which is connected into a careful sequence of learning.	Prior Learning	Future learning (Y10)
<ul style="list-style-type: none"> • Straight line graphs. • Forming equations. • Testing conjectures • 3D shapes • Constructions and congruency • Number • Using percentages • Maths and money. • Deduction • Transformations • Pythagoras theorem • Ratio, proportion and rates. • Probability. • Algebraic representations. 	<ul style="list-style-type: none"> • Calculate the gradient of line segments. • Plot and interpret straight line graphs. • Solve a range of different linear equations. • Calculate the circumference and area of circles. • Construct triangles and bisectors or lines and angles accurately. • Calculate reverse percentages. • Carry out the 4 transformations on shapes. • Use proportionality and scale factors to find missing sides lengths in similar shapes. • Use and apply Pythagoras theorem. • Test if a triangle is right angled using the converse of Pythagoras. • Solve a range of problems with real life situations when given the ratio that links them. • Calculate with compound measures. • Calculate simple probabilities. • Calculate the probability of independent events. • Use simple tree diagrams to calculate probabilities. 	<ul style="list-style-type: none"> • What gradient and intercept means. • Know that solving equations involves simplifying using inverse operations. • How π connects to circumference and area of circles. • Know what congruent means. • What rational and irrational numbers are. • Know how to use percentage multipliers in a variety of question types. • Know how to combine algebraic skills in context such as angles to solve problems. • Know the 4 transformations and what effects they have on shapes. • Know that similar shapes are enlargements of each other. • Know that Pythagoras links to the side lengths of all right-angled triangles. • Know that ratios are a multiplicative relationship. • Know what compound measures are. • Know what independent events mean in probability. • Know the formation for tree diagrams for probability questions. 	<ul style="list-style-type: none"> • Working in cartesian plane on simple graph plotting and identifying features of different lines. • Unit on ratio where circle circumference was investigated and then unit on area of simple shapes. • Unit on construction and measuring. • Number block builds on ideas developed previously on number. • Percentages is built on with an applied focus. • Angle work links to summer 1 block on angles in parallel lines and polygons. • Line symmetry and reflection block in Y8 is developed within y9. • Pythagoras in Y9 builds upon knowledge of square numbers and properties of right-angled triangles, Pythagoras itself however is new in Y9. • Ratio notation, concepts and simple applications to things like conversions, similar shapes and π are developed in Y9. • Probability develops in Y9 • Use of coordinates and plotting straight line graphs using tables of values is developed into non-linear graphs in Y9. 	<ul style="list-style-type: none"> • Linear graph and equation blocks develop into solving simultaneous equations graphically and algebraically. • 2D and 3D shape work develops with increased problem solving as well as calculations involving cones, spheres and parts of circles. • Use work on similarity and constructions in Y9 and develop and support students' understanding of congruence and use of the trigonometric ratios. • Y9 number work extends to include rounding and limits of accuracy in Y10. • Percentage and money work develops to include compound and simple interest and finding original values. • In Y10 students encounter the three trigonometric ratios for the first time which complements the earlier work on Pythagoras in relation to right angled triangles. • Scale factors involving area and volume develops earlier ratio work from Y9. • Tree diagrams are introduced to probability. • Quadratic graph plotting develops into interpreting the graphs and using them to solve more complex simultaneous equations.

The Big Picture – Intent:

Y10 Mathematics has been created to support flexibility while maximising progression. Topics covered revisit prior learning whilst enabling students to extend themselves and reach their potential.

'Learning Programme' blocks to be covered: Similarity, Developing algebra, Geometry, Proportions and proportional change, Delving into data, Using number.

Each term is split into two halves with a common theme, each half is split into further blocks that ensure students spend enough time to get a deep understanding of the topic covered. Blocks have been designed with interleaving as a key element enabling students to revisit previous work, develop knowledge and understanding and further extend their skills.

Number work is emphasized throughout the blocks alongside estimation. Calculator skills have been incorporated throughout the curriculum, thus enabling all students to access the materials presented.

All students will be able to access the main content of all lessons and all students will be taught to the top with scaffolding, adaptive teaching and stretch and challenge provided where necessary.

Implementation:

There will be 3 blocks of approx. 6 weeks each. Each lesson will involve a retrieval starter usually a mathsbox WR skills task or a WR flashback 4.

Independence and study skills will be fostered through challenging questions and problems, modelling, deep thinking and homework All students will receive a PLC after each end of unit and termly assessment.

Lessons will be based around multiple representations; Concrete, Pictorial, Abstract to give a deeper understanding of concepts. Reasoning will be developed through the exploration of mathematical patterns and images with a variety of problem-solving methods for just one question.

Learning to move forward and uncover mathematical ideas from mistakes and misconceptions via true/false, spot the mistake and other reasoning tasks where students are required to make a judgement and justify their answers.

A knowledge organiser will be provided for each block to enable students to recall keywords, facts, formulas and/or formal methods.

Students will be given opportunities for awe and wonder where they are able to break down a barrier they had previously and encounter wow moments about the things they are learning.

Numeracy and calculator skills will be embedded.

Key Summative Assessments:

One formal assessment every term which comprises of 2 papers.

Shorter end of unit assessments after each unit.

DFM and Mathwatch Retrieval homework.

Live marking and low stakes quizzing

Autumn Term

Reasoning with Algebra
Constructing in 2 and 3 dimensions

Spring Term

Reasoning with Number
Reasoning with Geometry

Summer term

Reasoning with proportion
Representations
End of year Assessment.

Impact:

Students will have increased understanding and confidence in Maths and be able to apply new skills to new and challenging mathematical problems.

Students will have developed their AO2/3 skills enabling them to manipulate familiar and unfamiliar vocabulary and deduce mathematical content.

They will be familiar with a variety of exam questions and be suitably prepared to answer examination style questions. There will be an increase in attainment, evidenced in regular, formal and interleaved assessments.

<p>Content/Units</p>	<p>Disciplinary Knowledge (Skills) This is the actions taken within a topic to gain substantive knowledge</p>	<p>Substantive Knowledge This is the specific, factual content for the topic, which is connected into a careful sequence of learning</p>	<p>Prior Learning</p>	<p>Future learning (Y11)</p>
<ul style="list-style-type: none"> • Congruence and similarity. • Trigonometry • Equations and inequalities • Simultaneous equations. • Angles and bearings. • Circles. • Vectors • Ratio and fractions. • Percentages and interest. • Probability • Data • Non Calc methods • Number and sequences • Indices and roots. 	<ul style="list-style-type: none"> • Enlarge a shape from a centre. • Find missing sides in similar shapes. • Use Work out missing side lengths and angles in right angled triangles. • Form and solve equations and inequalities representing solutions graphs and on a number line. • Form and solve linear simultaneous equations graphically and algebraically. • Use bearings to solve problems. • Find area and circumference of circular shapes and parts of circles. • Use ratios to find best buys and convert currencies. • Calculate amounts after repeated percentage changes. • Calculate probabilities for a range of situation types. • Find exact answers to calculations. • Use factors, multiple and primes to solve problems. • Work out powers and roots. • Calculate using standard index form. 	<ul style="list-style-type: none"> • Know what congruent means and what the rules for congruent triangles are. • Know what similarity is and how it links to enlargement. • Know the 3 trigonometric ratios and have an appreciation that they link to similar triangles. • Know that manipulating and solving equations/inequalities requires inverse operations. • Understand bearings and how to use them to describe angles between two points. • Know the parts of a circle. • Understand vector notation and how they can be drawn and used in calculations. • What links ratio, fractions percentages and decimals. • Understand what mutually exclusive and independence means in relation to probability. • Use and understand lines of best fit including its limitations. • Know what is meant by exact answers. • Know the difference between arithmetic and geometric sequences. 	<ul style="list-style-type: none"> • Y9 unit on constructions and congruency. • Y8 unit on multiplicative relationships. • Y9 Pythagoras unit and Summer block looking at ratios in similar right-angled triangles. • Y8 and 9 work on solving equations and inequalities linked with work on straight line graphs. • Y8 and 9 work on angles inc. chains of reasoning. • Y8 units on circumference of a circle (within ratios) and area of a circle. • Y9 unit Spring units on percentages and money. • Y9 Summer unit on probability. • Y7/8 units on frequency tables, bar charts, pie charts and misleading graphs. • Previous work on exact answers and using surd form. • Y9 unit on testing conjectures about sequences. • Y9 units on powers and roots. 	<ul style="list-style-type: none"> • Y11 unit on loci. • Y11 revisits trigonometry including exploring graphs of trig functions and their transformations for higher students. • Forming and solving quadratic equations in Y11. • During Y11 we review, deepen and strengthen understanding of angles. • Y11 unit on multiplicative reasoning, Spring term. • Y11 unit on listing and describing incorporating sample spaces and Venn diagrams for probability. • Substituting into kinematics formula. • Function notation including composite and inverse functions for higher tier.

The Big Picture – Intent:

Y11 Mathematics is the final year of GCSE where students strengthen their mathematical skills and knowledge enabling them to succeed in their final examinations. There is an emphasis on reasoning skills and problem solving in preparation for the final examinations.

'Learning Programme' blocks to be covered: Graphs, Algebra, Reasoning. Each term is split into two halves with a common theme, each half is split into further blocks that ensure students spend enough time to get a deep understanding of the topic covered. Blocks have been designed with interleaving as a key element enabling students to revisit previous work, develop knowledge and understanding and further extend their skills.

Number work is emphasised throughout the blocks alongside estimation. Calculator skills have been incorporated throughout the curriculum, thus enabling all students to access the materials presented.

All students will be able to access the main content of all lessons and all students will be taught to the top with scaffolding, adaptive teaching and stretch and challenge provided where necessary.

Implementation:

There will be 3 blocks of approx. 6 weeks each. Each lesson will involve a retrieval starter usually a Mathsbox WR skills task or a WR flashback 4.

Independence and study skills will be fostered through challenging questions and problems, modelling, deep thinking and homework. All students will receive a PLC after each end of unit and termly assessment.

Lessons will be based around multiple representations; Concrete, Pictorial, Abstract to give a deeper understanding of concepts. Reasoning will be developed through the exploration of mathematical patterns and images with a variety of problem-solving methods for just one question.

Learning to move forward and uncover mathematical ideas from mistakes and misconceptions via true/false, spot the mistake and other reasoning tasks where students are required to make a judgement and justify their answers.

A knowledge organiser will be provided for each block to enable students to recall keywords, facts, formulas and/or formal methods.

Students will be given opportunities for awe and wonder where they are able to break down a barrier they had previously and encounter wow moments about the things they are learning.

Numeracy and calculator skills will be embedded.

Key Summative Assessments:

One formal assessment every term which comprises of 2 papers.

Shorter end of unit assessments after each unit.

DFM and Mathwatch Retrieval homework.

Live marking and low stakes quizzing

Autumn Term

Graphs

Algebra

Mock Exams 1

Spring Term

Reasoning

Mock Exams 2

Summer term

GCSE Exams

Impact:

Students will have increased understanding and confidence in Maths and be able to apply new skills to a variety of new and challenging mathematical problems. Students will know more and remember more. There will be an increase in attainment, evidenced in regular, formal and interleaved assessments.

Content/Units	Disciplinary Knowledge (Skills) This is the actions taken within a topic to gain substantive knowledge	Substantive Knowledge This is the specific, factual content for the topic, which is connected into a careful sequence of learning	Prior Learning	Future learning (Y12)
<ul style="list-style-type: none"> • Gradients and lines • Non-linear graphs • Using graphs • Expanding and factorising • Changing the subject. • Functions • Multiplicative reasoning. • Geometric reasoning • Transforming and constructing. • Listing and describing. • Show that. 	<ul style="list-style-type: none"> • Find and use equations of straight lines. • Plot and read from various non-linear graphs both algebraic and applied. • Expand and factorise expressions including quadratics. • Solve quadratic equations. • Change the subject of real formulae. • Calculate the volume of a pyramid. • Find outputs and inputs of functions. • Calculate with pressure and density. • Find angles using chains of reasoning. • Find missing sides and angles using Pythagoras and trigonometry. • Perform standard constructions using a compass, ruler and protractor. • Complete and use Venn diagrams in probability. • Use data to compare distributions. • Illustrate equivalence numerically and algebraically. 	<ul style="list-style-type: none"> • Know what the parts of $y = mx+c$ mean in relation to straight line graphs. • Understand and find roots from non-linear graphs. • Know what speed means and how its units are formed. • Know that expanding and factorising are opposites and that the quadratic expressions link to the area of rectangles. • Know the connection between a prism and its respective pyramid. • Understand when a problem requires additive or multiplicative reasoning. • Know the rules for indices and why they are true. • Understand the link between times tables and the nth term rule for arithmetic sequences. • Know the standard loci. • Understand how a Venn diagram is constructed and what the different parts mean. • Know what the words plan, and elevations mean. • Know all the rules for angles and how to describe them fully. 	<ul style="list-style-type: none"> • Y9 units on straight line graphs. • Y10 unit solving equations graphically. • Y8 and 9 expanding double brackets. • Y9 equations and inequalities unit included changing the subject. • Functions links back to and develops KS3 work on function machines. • Multiplicative reasoning continues to build on the idea of direct proportion and multiplicative relationships. • Y9 unit on constructions, loci and plans/elevations. • Y10 unit comparing distributions and drawing various statistical diagrams. • Probability of independent and mutually exclusive events including using tree diagrams. • Congruent triangles, reasoning with angles and circle theorems. 	<ul style="list-style-type: none"> • Co-ordinate geometry; equations of normals and tangents. • Solving harder quadratics, using the discriminant and looking at modelling with quadratics. • Being able to confidently rearrange equations and formulae is crucial to A level maths. • Using function notation and finding composite and inverse functions as well as identifying their domain, range and co-domain. • Transformation of graphs and functions. • A level applied probability. • Using mathematical reasoning to show that something is true or not true.

The Big Picture Intent:

Y12 Mathematics is designed to maximise progression in preparation for Y13 or AS Level outcomes. Many topics presents opportunities to recap on GCSE covered content linking this to brand new A-Level content. All topics give students the chance to extended themselves on the journey to achieving their potential.

The learning programme is designed so that students should be able to select and correctly carry out routine procedures, accurately recalling facts, terminology, and definitions. They should be able to reason, interpret and communicate mathematically, constructing rigorous mathematical arguments (including proofs) to make deductions and inferences. They would be encouraged to assess the validity of mathematical arguments, explain their reasoning; and use mathematical language and notation correctly. Lessons will include time helping pupils to translate problems in mathematical and non-mathematical contexts into mathematical processes, interpret solutions to problems in their original context, and, where appropriate, evaluate their accuracy and limitations. Use mathematical models and the evaluation their outcomes enables pupils to recognise the limitations of models and, where appropriate, explain how to refine them.

Implementation:

10 lessons are split between 2 teachers with each teacher having 5 lessons a fortnight. Both teachers share the delivery of the pure content and then one teacher teaches the statistics and the other the mechanics.

Lessons are based around developing a deeper understanding of concepts. Reasoning will be developed through exploration of mathematical patterns and looking where possible at proofs. Solving problems in different ways will be investigated where possible to demonstrate the many wonderful links in mathematics.

Formal structures to answering A level questions will be embedded as will numeracy and use of a graphical calculator to support specific topics at A level.

Key Summative Assessments:

2 to 3 cumulative formal assessments each term.

Summer term mocks based on the AS papers.

Mixture of DFM Retrieval and paper-based homework as well as some instances of flipped learning.

Live marking and low stakes quizzing when needed.

Students have separate independent study books which are monitored and checked half termly.

Autumn Term

Algebra and functions, Coordinate Geometry, Trigonometry, Vectors, Further algebra

Spring Term

Differentiation, Integration, Exponentials and Logs, Further Algebra, Kinematics, Representation and Interpretation

Summer term

Probability, Statistical Distributions, Hypothesis Testing, Forces and Newton’s Law, Proof, Functions, Sequences and Series

Impact:

Students will have increased understanding and confidence in A-Level Maths and be able to apply new skills to a variety of new and challenging mathematical problems. Students will know more and remember more. Students will have developed skills enabling them to manipulate familiar and unfamiliar vocabulary and deduce mathematical content. They will be familiar with a variety of exam questions and be suitably prepared to answer examination style questions. There will be an increase in attainment, evidenced in regular, formal and interleaved assessments.

<p>Content/Units</p>	<p>Disciplinary Knowledge (Skills) This is the actions taken within a topic to gain substantive knowledge</p>	<p>Substantive Knowledge This is the specific, factual content for the topic, which is connected into a careful sequence of learning</p>	<p>Prior Learning</p>	<p>Future learning (Y13)</p>
<ul style="list-style-type: none"> • Algebraic expressions • Graphs and transformations • Coordinate geometry including circles • Vectors • Trigonometry • Exponentials and logarithms • Binomial expansion • Differentiation • Integration • Representing data • Probability distributions and testing • Kinematics • Newton's laws • Mathematical proof 	<ul style="list-style-type: none"> • Use laws of indices to simplify expressions and solve equations • Use a variety of methods to solve quadratic equations formed from a practical situation • Find and use equations of straight lines, circles and parabolas • To use and manipulate exponential and logarithmic equations • Solve trig equations, finding all solutions within a given range • Differentiate polynomials to find gradients and turning points • Use integration to find equations of curves or the area underneath them • Use a graphical calculator to solve equations, draw graphs and investigate probability distributions • Write vectors in i and j notation 	<ul style="list-style-type: none"> • Know how to manipulate polynomials to find a solution and interpret its meaning. • Know the connections between parallel and perpendicular lines and their link the geometric shapes • Understand the exponential growth is and how it can relate to a rate of change. • How to reduce an exponential graphs to linear form using logs • Recognise when to use different methods for finding probabilities based on the format of the information • To appreciate statistical terminology and understand how this relates to the process to be used. • Interpret what the value of the discriminant shows 	<ul style="list-style-type: none"> • Find and use equations of straight lines. • Plot and read from various non-linear graphs both algebraic and applied. • Solve simultaneous equations • Expand and factorise quadratics. • Solve quadratic equations. • Change the subject of formulae. • Find outputs and inputs of functions. • Find missing sides and angles using Pythagoras and trigonometry. • Use data to compare distributions. • Illustrate equivalence algebraically. • Know the rules for indices. 	<ul style="list-style-type: none"> • Develop methods to differentiate/integrate composite functions, products and quotients • Enhance use of trigonometric identities to include double angles and compound angles. • Discovery of graphs of more complex functions and the connections between them • Use knowledge of probability to support claims • Scrutiny of sequences, their patterns and summations • Geometric applications of vectors • Further numerical methods to find roots of polynomials

The Big Picture – Intent:

Y13 Mathematics is designed to maximise progression in preparation for Y13 Examination and Maths at Degree Level. Many topics presents opportunities to recap on Year 12 covered content linking this to brand new Year 2 A-Level content. All topics give students the chance to extended themselves on the journey to achieving their potential.

The learning programme is designed so that students should be able to select and correctly carry out routine procedures, accurately recalling facts, terminology, and definitions. They should be able to reason, interpret and communicate mathematically, constructing rigorous mathematical arguments (including proofs) to make deductions and inferences. They would be encouraged to assess the validity of mathematical arguments, explain their reasoning; and use mathematical language and notation correctly. Lessons will include time helping pupils to translate problems in mathematical and non-mathematical contexts into mathematical processes, interpret solutions to problems in their original context, and, where appropriate, evaluate their accuracy and limitations. Use mathematical models and the evaluation their outcomes enables pupils to recognise the limitations of models and, where appropriate, explain how to refine them.

Implementation:

Lessons are split between 3 teachers. 2 teachers have 4 lessons a fortnight sharing the pure and statistics content with the third teacher doing a small amount of pure and all the mechanics during 2 lessons a fortnight.

Lessons are based around developing a deeper understanding od concepts. Reasoning will be developed through exploration of mathematical patterns and looking where possible at proofs. Solving problems in different ways will be investigated where possible to demonstrate the many wonderful links in mathematics.

Formal structures to answering A level questions will be embedded as will numeracy and calculator skills specific to A level.

Key Summative Assessments:

Formal Assessment Autumn (2), Spring(1) plus Mocks.

Y13 January Mocks

Y13 March Mocks

Mixture of DFM Retrieval and paper based homework as well as some instances of flipped learning.

Live marking and low stakes quizzing when needed.

Students have separate independent study books which are monitored and checked half termly.

Autumn Term:

Algebraic Methods, Binomial Expansion, Differentiation, Proof, Trigonometry, Vectors, Sequences and Series, Moments. Projectiles.

Spring Term:

Projectiles(cont'd), Forces, Integration, Regression and correlation, functions, parametric equations.

Mock Exams (1)

Summer term:

Normal distribution, Integration (cont'd), parametric equations (cont'd), numerical methods, probability, Forces (cont'd), Kino.

Impact:

Students will have increased understanding and confidence in Maths and be able to apply new skills to a variety of new and challenging mathematical problems. Students will know more and remember more. There will be an increase in attainment, evidenced in regular, formal and interleaved assessments.

<p>Content/Units</p>	<p>Disciplinary Knowledge (Skills) This is the actions taken within a topic to gain substantive knowledge</p>	<p>Substantive Knowledge This is the specific, factual content for the topic, which is connected into a careful sequence of learning</p>	<p>Prior Learning</p>	<p>Future learning (Y13)</p>
<ul style="list-style-type: none"> • Algebraic methods • Functions and graphs • Sequences and series • Binomial expansion with negative or fractional powers • Radians and further trigonometry • Parametric equations • Further differentiation • Implicit differentiation • Numerical methods • Further integration • Partial fractions • Vectors in 3 dimensions 	<ul style="list-style-type: none"> • Four rules of fractions in algebraic form • Split into partial fractions • Use the formula to expand a binomial • Convert between degrees and radians • Differentiate a variety of functions including composites, exponentials, logarithms and trig • Use implicit differentiation for equations where x and y are not separable • Use parametric methods for situations involving a 3rd variable • Use sign change, iteration and Newton-Raphson to solve equations • Find areas using integration or approximations • Use integration methods such as substitution and by parts 	<ul style="list-style-type: none"> • Recognise when each differentiation method is appropriate • Apply relevant trigonometric identities to an equation to prove a link or solve an equation • Construct extended arguments to solve problems presented in an unstructured form, including problems in context. • Construct and present mathematical arguments through appropriate use of diagrams; sketching graphs; logical deduction; precise statements involving correct use of symbols and connecting language • Understand that many mathematical problems cannot be solved analytically, but numerical methods permit solution to a required level of accuracy. 	<ul style="list-style-type: none"> • Algebraic expressions • Graphs and transformations • Coordinate geometry including circles • Vectors • Trigonometry • Exponentials and logarithms • Binomial expansion • Differentiation • Integration • Representing data • Probability distributions and testing • Kinematics • Newton's laws • Mathematical proof 	<ul style="list-style-type: none"> • Extend calculus techniques to include partial and multiple differentiation and integration • Eigenvalues and eigenvectors • Laplace transforms • Analysis • Numerical analysis • Discrete mathematical structures including Boolean algebra