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| **Year 11 – Mathematics – 2024-25**  |
| **Curriculum intent** | Through mathematics lessons we promote mathematical thinking to allow all students to achieve their mathematical potential and engage in the study of mathematics. Using a mastery style approach to mathematics allows all students to develop their fluency, reasoning and problem-solving using representations of mathematical ideas. As students progress, topics from previous studies with be interleaved into future learning so students develop application and skill links between different areas of mathematics.In Year 11, students continue their GCSE by studying probability, including the use of different representations such as frequency tables, Venn diagrams and tree diagrams before moving onto data handling – looking at the limitations of data, representing data and evaluating different measures of location and dispersion. They will be encouraged to consider and to be critical of how reliable the data is, and whether it is safe to extrapolate using data which will be presented to them in a variety of forms. Returning to number skills, students will enhance and develop their non-calculator methods for calculations by considering number theory. They will work with primes, powers, roots, and standard index form. Higher tier students will learn about fractional indices, surds, rational/irrational numbers including how to calculate with them. They will work with more complex algebraic fractions and with limits of accuracy.Students will further develop their algebraic understanding as they study graphs, including how to represent equations as graphs, and consider linear and non-linear graphs. Higher tier students will look at finding the equation of a graph including equations of parallel and perpendicular lines. They will also explore equations of circles and tangents to circles. All students will have the opportunity to further deepen their understanding of graphs when applied to different contexts such as distance/time, conversion graphs etc. As Year 11 continues, algebraic manipulation skills are further developed as they work with expressions and equations, expanding and factorising, changing the subject and working with functions. Students are constantly building on prior understanding and when looking at the reasoning units, they will have the opportunity to apply their skills to a variety of situations which can include proportional reasoning, working with geometry and algebra. This gives them the opportunity to revise key skills and apply them to revision based multi-step questions to help them prepare for their final examinations. Units such as Show That will ensure that students are able to apply and communicate their mathematical understanding effectively to others – a vital skill for the exams.Throughout the year, students will have the opportunity to review and retrieve their understanding from earlier learning. They will be building a secure understanding as they prepare to take their GCSE examinations.  |
| **Term** | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1** | **Summer 2** |
| **Knowledge** | * Probability
* Collecting, Representing, and Interpreting data
* Non-calculator Methods
 | * Types of Number and Sequences
* Indices and Roots
* Manipulating Expressions
* Gradients and Lines
* Non-Linear Graphs
 | * Using Graphs
* Expanding and Factorising
* Changing the Subject
* Functions
 | * Multiplicative Reasoning
* Geometric Reasoning
* Algebraic Reasoning
* Transforming and Constructing
* Listing and Describing
* Show That…
 | * Revision and Examinations
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| **Term** | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1** | **Summer 2** |
| **Skills****Higher Tier Skills in Bold.** | * Know that the probability of an exhaustive set of mutually exclusive events sum to one.
* Use a probability model to predict the outcomes of future experiments.
* Calculate the probability of independent and dependent combined events using probability trees.
* **Calculate and interpret conditional probabilities using expected frequencies with two-way tables, tree diagrams and Venn diagrams.**
* Use, interpret and compare observed distributions of a single variable through appropriate graphical representation involving discrete and continuous data.
* Construct and interpret frequency tables, bar charts, pictograms, vertical line charts for ungrouped and grouped data.
* Describe, interpret, and compare graphical representations involving discrete, continuous and grouped data including calculations of the mean, median, mode and spread of the data.
* Infer properties of populations whilst knowing the limitations of sampling.
* **Construct and interpret diagrams for grouped date and discrete data, for example, histograms and cumulative frequency graphs, including boxplots.**
* **Interpret, analyse, and compare measures of spread including modal class, quartiles and interquartile range.**
* Calculate exactly with fractions, **(surds)** and multiples of $π$.
* **Simplify surd expressions involving squares and rationalise denominators.**
* **Change recurring decimals into their corresponding fractions and vice versa.**
* Apply and interpret limits of accuracy when rounding or truncating **(including upper and lower bounds).**
 | * Identify, use, and calculate with factors, multiples, primes, HCF and LCM.
* Describe and continue sequences.
* Recognise and use sequences of triangular numbers, simple arithmetic progressions and Fibonacci type sequences, quadratic sequences, and simple geometric progressions.
* Deduce expressions to calculate the nth term of linear **(and quadratic)** sequences.
* Recognise and use sequences of square and cube numbers.
* **Estimate powers and roots of any given number.**
* Calculate with roots, and with integer **(and fractional)** indices.
* Calculate with numbers in standard form $A×10^{n}$.
* Simplify expressions involving sums, products and powers including the laws of indices.
* Simplify and manipulate algebraic expressions **including those involving surds and algebraic fractions** by factorising quadratic expressions.
* Know the difference between an equation and an identity.
* Argue mathematically to show algebraic expressions are equivalent.
* **Use algebra to support and construct proofs.**
* Work with different numerical, algebraic, graphical and diagrammatic representations.
* Plot and interpret graphs.
* Interpret the gradient of a straight line as a rate of change.
* Use the form$y=mx+c$ to identify parallel **(and perpendicular)** lines.
* Find approximate solutions to two simultaneous equations in two variables (linear/linear, or **linear/quadratic**) using a graph.
* Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, reciprocal functions and **exponential functions.**
* Identify and interpret roots, intercepts of quadratic functions graphically.
* **Recognise and use the equation of a circle.**
 | * Plot and interpret graphs of non-standard functions in real contexts.
* To find approximate solutions to problems such as distance and speed.
* **Interpret the gradient as a point on a curve as the instantaneous rate of change.**
* **Calculate or estimate gradients of graphs and areas under graphs**.
* Know the difference between an equation and an identity.
* Argue mathematically to show algebraic expressions are equivalent and use algebra to support and construct arguments (**and proofs**.)
* Simplify and manipulate algebraic expressions by factorising quadratic expressions of the form $x^{2}+bx+c$
* **Factorising quadratic expressions of the form** $ax^{2}+bx+c$
* Solve quadratic equations (**including those that require rearrangement**) algebraically by factorising, **by completing the square and by using the quadratic formula.**
* **Find turning points by completing the square.**
* Solve linear inequalities in one variable.
* Translate situations into algebraic expressions or formula.
* Derive an equation or simultaneous equations and solve them.
* **Find approximate solutions to equations numerically using iteration.**
* Interpret simple expressions as functions.
* Solve quadratic inequalities.
* Represent solutions on a number line (**using set notation and on a graph.)**
* Recognise, sketch and interpret graphs of quadratic functions.
* Apply Pythagoras’ Theorem and trigonometric rations to find angles and lengths in right-angled triangles (**and general triangles**) in two **and three** dimensions.
 | * Compare lengths, areas and volumes using ratio notation and/or scale factors, make links to similarity.
* Understand that X is inversely proportional to Y is equivalent to $\frac{1}{Y}$
* **Construct and** interpret equations that describe direct and inverse proportion.
* Extend and formalise knowledge of ratio and proportion.
* Reason deductively in geometry, number and algebra including using geometrical constructions.
* **Apply and prove the standard circle theorems.**
* Interpret and use bearings.
* Apply addition and subtraction of vectors, multiplication of vectors by a scalar and diagrammatic and column representation of vectors.
* **Use vectors to construct geometric arguments and proofs.**
* Look for proofs and counter examples.
* Calculate the *nth* term of linear **and quadratic** sequences.
* Describe transformations.
* **Describe the changes and invariance achieved by combinations of transformations.**
* **Recognise, sketch and interpret graphs of trigonometric functions.**
* **Sketch translations and reflections of the graph of a given function.**
* Explore what can and cannot be inferred in statistical and probabilistic settings.
* Apply systematic listing strategies **including the use of the product rule for counting.**
* Construct and interpret plans and elevations of 3D shapes.
 | * Revision and past paper practice.
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| **Assessments** | * End of unit assessments.
* In class past paper practice.
 | * End of unit assessments.
* December Mock examinations.
 | * End of unit assessments.
* In class past paper practice.
 | * End of unit assessments.
* February Mock examinations.
 | * In class past paper practice.
* GCSE examinations
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| **Enrichment** | * Did you know you can use Sparx Maths for independent work in addition to your homework? https://www.sparxmaths.uk/
* Use Corbettmaths for extra resources such as videos and topic worksheets. https://corbettmaths.com/
 | * If you’ve been selected for the UKMT Intermediate Challenge questions – get some extra practice in!

https://www.interactive-maths.com/ukmt-random-question-generator.html * Prepare for the Mock assessment by using the following websites: https://corbettmaths.com/

https://www.mathsgenie.co.uk/  | * Try doing some online practice papers – can you answer the demon questions on this website? https://www.onmaths.com/
* Looking for some challenging problem-solving questions – try https://parallel.org.uk/
 | * Want to see how to apply your number problem-solving skills? Check out the activities on NRich – Number. https://nrich.maths.org/11359
* NRich also have lots of problem-solving skills related to probability and statistics on: https://nrich.maths.org/11362
 | * Have you checked out the following websites for extra revision resources? https://corbettmaths.com/

https://www.mathsgenie.co.uk/ https://www.onmaths.com/ |  |