

“Rooted and grounded in Love”.

Mathematics



Intent – ‘**Rooted** and grounded in Love’

At the heart of our curriculum is the belief that every young person can become confident Mathematicians. The development of Mathematical literacy is an issue of Social Justice; no child should leave school Mathematically illiterate. Our aim is to nurture and inspire, support and challenge, so that all students reach their full potential.

At De Lisle College, we teach for Mastery. Our curriculum is sequenced to enable students to master a topic before moving on to the next one. It is only by having a firm understanding of what has been taught, will you be confident in attempting what follows.

All students at De Lisle College follow the same curriculum. Year 7 acts as a bridge to what has been taught at primary school; mastering the core concepts of Mathematics, to act as building blocks for future years. Number and Algebra feature heavily as these are crucial components of future topics. The remainder of the Key Stage 3 curriculum interleaves and builds on these concepts, whilst introducing other areas of Mathematics, namely Statistics and Probability.

Students are placed into tiers at the beginning of Key Stage 4, to ensure the curriculum fully meets their needs and enables them to flourish. Concepts and topics from Key Stage 3 are revisited and built upon, to deepen students understanding and prepare them for their exams. Time is dedicated in year 11 to reteach prior content, ensuring all students feel confident and secure in their understanding of what has been taught.

Maths is very popular at KS5. Our knowledge rich curriculum exposes students to a range of new content, including mechanics and calculus; developing their analytical and logical thinking skills to inspire, challenge and ultimately prepare students for higher education and a career in STEM.

Ultimately our intent rests on three core principles. Every child should experience the joy of Mathematical thinking and understanding; that feeling of solving a really challenging problem. Every child should leave school Mathematically literate, confident and unintimidated by the subject. Every child deserves an outstanding Mathematics education.



A Level Maths

Year 12



De Lisle College
A Catholic Voluntary Academy

Curriculum Outline

Link to Catholic Social Teaching:

CST emphasizes that humans are made in the image of God, endowed with reason and given the divine gift of a capacity for critical thinking. Studying pure mathematics celebrates the pursuit of objective truth, order, and logic, which reflect the divine nature of the Creator. Students will develop mathematical communication, reasoning and problem-solving skills through discussion, collaboration and justification of methods, where they are encouraged to contribute ideas and explain their thinking, recognising the value and dignity of every student's voice.

In year 12 we start to explore concepts around exponentials and logarithms, in particular modelling. This links in with the stewardship and care for God's creation which focuses on our responsibility to protect our planet, and part of this is resource depletion and sustainability drives given the exponential growth of population.

As part of the Statistics starting in Lent, students study sampling, data presentation and statistical analysis, helping them understand how data is gathered to represent different groups within society. Through the CST of common good, subsidiarity and solidarity this encourages consideration of all voices being included in decision-making and how evidence can be used to improve outcomes for communities.

Advent 1	PURE - Manipulations of Algebra	Advent 2	PURE - Coordinate Geometry / Further Algebraic Skills / Vectors / Differentiation
Description	Perform essential manipulations of algebra, use the laws of indices, manipulate surds, solve quadratics equations and work with quadratic graphs, solve simultaneous equations, solve linear and quadratic inequalities including using graphs, use graphs of functions and sketch simple transformations of graphs.	Description	- Solve problems with coordinate geometry in the (x, y) plane by understanding the equation of a straight line, parallel and perpendicular lines, find lengths and areas using equations of straight lines, find the midpoint of a line segment, understand and use the equation of a circle and be able to use the properties of chords and tangents. - Use further algebraic skills to complete algebraic division, know how to apply the factor theorem, fully factorise a cubic expression, understand proof and solve problems using the binomial expansion. - Use vectors in two dimensions, calculate the magnitude and direction, add vectors diagrammatically and multiply by scalars, understand position vectors and find the distance between two points. - Differentiate including from first principles, apply differentiation to find gradients, tangents and normal, maxima and minima and stationary points and where functions are increasing or decreasing.

Lent 1	PURE - Trigonometry / Integration / Exponentials	Lent 2	STATS/ MECHANICS - Statistical Sampling / Data / Quantities and Units
Description	- Calculate with trigonometry using right angled trigonometry rules, the sine and cosine rules, finding the area of triangles, understand trigonometric graphs and understand and use trigonometric identities and equations. Integrate x^n and related sums, differences and constant multiples, evaluate definite integrals and use then to find the area under a curve. - Use exponentials including the function e^x and its graph, know how to use the definition of logarithms and understand the laws of logarithms.	Description	- Recall statistical sampling terminology and know the advantages and disadvantages of sampling over a census, understand and use sampling techniques and compare sampling techniques in context. Present and interpret data by calculating measures of location and measures of variation, understand and use coding, interpret diagrams for single-variable data, interpret scatter diagrams and regression lines, recognise and interpret outliers and draw simple conclusions from statistical problems - Understand and use fundamental quantities and units in the S.I. system (length, times & mass) and understand derived quantities and units (velocity, acceleration, force, displacement & weight).
Pentecost 1/2	STATS/ MECHANICS - Newton's First, Second and Third Laws / Probability / Discrete Statistical Distributions	Pentecost 1/2	STATS/ MECHANICS - Language of Kinematics / Calculus in Kinematics / Hypothesis Testing
Description	- Explain the concept of a force and understand and use Newton's first, second and third laws to draw force diagrams and solve problems in equilibrium including with smooth pulleys. - Understand and use mutually exclusive and independent events when calculating probability. - Use discrete statistical distributions to model real-world situations, identify the discrete uniform distribution, calculate probabilities using the binomial distribution.	Description	- Understand and use the language of kinematics, be able to represent them graphically, use a derive the formula for constant acceleration for motion in a straight line and understand and use weight and motion in a straight line under gravity. Use calculus (differentiation and integration) in kinematics for motion in a straight line where there is variable acceleration. - Understand and be able to apply the language of hypothesis testing, including significance levels developed through a binomial model and then carry out hypothesis tests.

A Level Maths

Year 13



De Lisle College
A Catholic Voluntary Academy

Curriculum Outline

Link to Catholic Social Teaching:

Students extend their knowledge further in Pure year 13 through numerical methods such as the Newton-Raphson method and differential equations, students explore how mathematics is used to model and solve real-world problems where exact solutions are not always possible. This enables students to model changing situations such as population growth, disease transmission and resource distribution. Students appreciate how mathematics can support evidence-based decision-making that benefits communities and helps address challenges faced by vulnerable groups, helping society make informed decisions about caring for creation and promoting the common good.

The use of vectors in modelling forces and mechanics for motion demonstrates how mathematics contributes to the design of safe structures, transport systems and technologies. Students recognise the role mathematics plays in creating environments that support human wellbeing, accessibility and participation in society.

The A Level Mathematics curriculum supports Catholic Social Teaching through the study of statistics, modelling and mechanics. Students learn how mathematics can be used to analyse social issues, inform fair decision-making and address challenges affecting society and the environment. By developing critical thinking, problem-solving and communication skills, students are equipped to contribute to the common good, care for creation, respect human dignity and support the wellbeing of others.

Advent 1	PURE - Proof / Algebraic Fractions / Modulus of Linear Function / Arithmetic and Geometric Sequences / Binomial Expansion	Advent 2	PURE - Trigonometry / Parametric Equations / Differentiation
Description	- Use proof by deduction and proof by contradiction to solve problems. - Simplify algebraic fractions by factorising and cancelling & also decompose rational functions into partial fractions. - Understand the modulus of a linear function, use composite functions, inverse functions and their graphs, understand the effect of simple and combined	Description	Demonstrate a deep knowledge of trigonometry by working with radian measure to find arc length and the area of a sector, use the standard small angle approximations, know and use exact values of sin, cos and tan, understand and use secant, cosecant, arcsin, arccos and arctan and their graphs, prove and use the compound angle formulae, double (and half) angle formula, solve equations of the form $a \cos \theta + b \sin \theta = c$ in a given interval, construct proofs involving trigonometric identities and solve problems in context.

	transformations and use functions in modelling considering limitations. • Work with arithmetic and geometric sequences including those given by the nth term and those generated by $x^{n+1} = f(x^n)$, understand the use of sigma notation for sums of series, work with convergent geometric sequences and use sequences and series in modelling. • Understand and use the binomial expansion of $(a + bx)^n$ for rational n, including its use for approximation and be able to use partial fractions to write a rational function as a series expansion.		• Understand and use the parametric equations of curves and conversions between Cartesian and parametric forms and use parametric equations in modelling a variety of contexts. • Differentiate $\sin x$ and $\cos x$ from first principles, differentiate exponentials and logarithms, differentiate products, quotients, implicit and parametric functions, calculate second derivatives to understand rates of change of gradient and inflections and explore rates of change problems including growth and kinematics.
Lent 1	PURE - Numerical Methods / Integration / Integrate by Substitution and by Parts / Vectors	Lent 2	STATS/ MECHANICS - Correlation Coefficients / Probability / Moments / Resolve Forces / Apply Kinematics
Description	• Use numerical methods to find the location of roots, solve equations approximately using iterative methods including the use of staircase and cobweb diagrams, solve equations using the Newton-Raphson method and solve other problems in context. • Integrate x^n and expressions by inspection using the reverse chain rule, integrate exponentials and trigonometric functions, use the reverse of differentiation and use trigonometric identities to manipulate integrals. • Integrate by substitution and by parts, use partial fractions to integrate rational expressions and simplify expressions using the law of logarithms, find areas under graphs or between two curves, use the trapezium rule and be able to write and solve differential equations. • Use vectors in three dimensions, knowing how to use column vectors and i, j and k unit vectors.	Description	• Change the variable and estimate values in a regression line, understand correlation coefficients and be able to conduct a hypothesis test for zero correlation. • Use set notation for probability, use tree diagrams, Venn diagrams and two-way tables, understand and use the conditional probability formula and model and critique assumptions with probability. • Understand and use moments in simple static contexts. • Resolve forces at any angle in two dimensions at and understand the model for friction, calculating the coefficient of friction, & the motion of a body on a rough surface. • Apply kinematics to model the motion of projectiles under gravity in a vertical plane using vectors.

Pentecost 1	STATS/MECHANICS - Normal Distribution / Equilibrium and Statics of a Particle/ Further Kinematics	Pentecost 2	Revision & Exams
Description	- Understand and use the normal distribution, use it as an approximation to the binomial distribution, find the mean and variance of a binomial distribution, and select the appropriate distribution to solve a problem and conduct hypothesis tests for the mean of the normal distribution. - Understand equilibrium and statics of a particle, including ladder problems and the dynamics of a particle, applying the rules of forces. Understand further kinematics in explaining constant acceleration (and equations of motion in two dimensions using the i, j system) and variable acceleration using calculus).	Description	/