A Level Maths Topic List

Pure Maths

Topics	Revised
Proof	
Proof by deduction	
Proof by exhaustion	
Disproof by counter example	
Proof by contradiction	
Algebra and functions	
Laws of indices	
Manipulate surds and rationalise denominators	
Quadratic graphs	
The discriminant	
Factorise by completing the square	
Stealth quadratics	
Simultaneous equations (both linear)	
Simultaneous equations (one linear, one non-linear)	
Solve linear inequalities	
Solve quadratic inequalities	
Use set notation to express solutions to inequalities	
Represent linear and quadratic inequalities graphically	
Expand multiple brackets	
The factor theorem	
Factorise polynomials	
Simplify rational expressions by factorising, cancelling and algebraic division	
Use factorisation to simplify algebraic fractions	
Use algebraic division	
Sketch the graphs of simple equations, including polynomials	
Sketch the graph of the modulus of a function	
Sketch the graphs of reciprocal functions ($\frac{1}{x}$ and $\frac{1}{x^2}$)	
Composite and inverse functions	
Transformations of graphs	
Partial fractions	

Coordinate geometry	
Parallel and perpendicular lines	
Equations of straight lines, in the form $ax + by + c = 0$ and $y = mx + c$	
Equations of circles, in the form $(x - a)^2 + (y - b)^2 = r^2$	
Parametric equations	
Apply circle theorems to circles, their tangents and chords	
Sequences and series	
Expand $(a + bx)^n$, where n is a positive integer	
Expand $(a + bx)^n$, where n is a rational number	
Solve problems by using and applying the binomial expansion	
Sequences in the form $x_{n+1} = \text{f}(x_n)$	
Arithmetic sequences, including n^{th} term formulae and sum to n terms	
Geometric sequences, including n^{th} term formulae and sum to n terms	
Trigonometry	
Sine rule, cosine rule and area of any triangle	
Work with radians, including area of a sector and arc length	
Small angle approximations	
Sine, cosine and tangent graphs	
Reciprocal trigonometric functions (sec, cosec and cot)	
Know and use exact trigonometric values in degrees and radians	
Know and use trigonometric identities	
Double angle formulae	
Solve trigonometric equations in a given interval	
Exponentials and logarithms	
Functions of the form e^x and a^x, where a is positive	
Use $\log_a x$ as the inverse of a^x	
Understand the function $\ln x$	
Laws of logarithms	
Solve exponential equations	
Model exponential growth and decay	
Logarithmic graphs of the form $y = ba^x$ and $y = bx^a$	
Differentiation	
Interpret the derivative of f(x) as the rate of change (gradient) of $y = \text{f}(x)$	
Differentiation from first principles	
Differentiate functions of the form x^n, where n is a positive integer	
Differentiate functions of the form x^n, where n is negative or fractional	
Differentiate trigonometric and reciprocal trigonometric functions	

Differentiate e^{kx} and a^{kx}	
Differentiate $\ln x$	
Find the equations of tangents and normals	
Find maxima, minima, stationary points and points of inflection	
Identify increasing and decreasing functions	
Use modelling and differentiation in applied situations	
Differentiate using the product rule	
Differentiate using the chain rule	
Differentiate using the quotient rule	
Differentiate parametric equations	
Differentiate implicitly	
Construct differential equations	
Integration	
Fundamental Theorem of Calculus	
Integrate functions of the form x^n	
Evaluate definite integrals	
Integrate e^{kx} and $\frac{1}{x}$	
Integrate trigonometric and reciprocal trigonometric functions	
Find the area between a curve and the x-axis	
Use vectors to find areas between curves and straight lines	
Find the area between two curves	
Integrate by substitution	
Integrate by parts	
Integrate with partial fractions	
Integrate by substitution	
Solve differential equations	
Numerical methods	
Locate roots of f(x) = 0 by considering change of sign	
Use iterative methods to solve equations	
Use Newton-Raphson method to solve equations	
Use the trapezium rule to estimate the area under a curve	
Vectors	
Use vectors in 2D and 3D	
Calculate the magnitude and direction of 2D vectors	
Vector addition and multiplication by a scalar	
Position vectors	
Solve geometric problems using vectors	

Statistics

Throughout all of these topics, you should ensure you are familiar with the keywords relating to statistics.

Topics	Revised
Sampling	
Understand and use sampling techniques	
Compare sampling techniques	
Data presentation and interpretation	
Venn diagrams	
Draw and interpret histograms	
Draw and interpret box plots	
Draw and interpret scatter diagrams and regression lines	
Understand and interpret correlation	
Calculate measures of location (mean, median and mode)	
Calculate measures of spread (range and interquartile range)	
Calculate standard deviation	
Identify outliers and clean data	
Probability	
Venn diagrams	
Mutually exclusive and independent events	
Conditional probability	
Discrete and continuous distributions	
Model with probability	
Statistical distributions	
Simple, discrete probability distributions	
Binomial distributions	
Normal distributions	
Statistical hypothesis testing	
Conduct 1- and 2-tail binomial hypothesis tests	
Understand significance levels	
Evaluate critical regions and values	
Hypothesis tests of correlation coefficients	
Hypothesis tests for the mean of a normal distribution	

Mechanics

Throughout all of these topics, you should ensure you are familiar with the keywords and units relating to mechanics.

Topics	Revised
Kinematics	
Displacement-time graphs	
Velocity-time graphs	
Constant acceleration equations (SUVAT), including in 2D with vectors	
Motion due to gravity	
Variable acceleration formulae, including in 2D with vectors	
Projectiles and motion under gravity	
Forces and Newton's laws	
Force diagrams	
Newton's first law	
Newton's second law	
Newton's third law	
Connected particles	
Smooth pulleys	
Resolving forces in 2 dimensions	
Resultant forces	
Coefficient of friction, $F \leq \mu R$	
Moments	
Understand and use moments in simple static contexts	