

Higher Mathematics – Prelim – Checklist

You have covered the following

Straight Line

- Distance formula
- Gradient of a straight line
- Equations of lines
- Perpendicular lines
- Parallel lines
- Collinearity of points
- Finding the equation of a perpendicular bisector, an altitude and a median
- Finding the point of intersection of two lines

Functions and Graphs

- Evaluating a function
- Inverse functions
- Composite functions
- Domain, Range
- Exponential and Logarithmic functions
- Transformations of functions, including trig functions and exponential and logarithmic functions
- Exact values for \sin , \cos , \tan of 30° , 45° , 60° , $\pi/6$, $\pi/4$, $\pi/3$ etc and related angles i.e. $\cos 120^\circ$, $\tan 3\pi/4$ etc

Differentiation

- Differentiating a function
- Calculating the rate of change of a function
- Calculating the gradient of a tangent to a curve
- Finding the equation of a tangent to a curve
- Identifying where functions are increasing and decreasing
- Identifying stationary points and their nature
- Sketching a curve
- Sketching the graph of the derivative of a function
- Finding the maximum and minimum values of a function on a closed interval
- Finding the maximum and minimum values of a function in context (optimisation)

Recurrence Relations

- Using recurrence relations
- Evaluating a given term of a recurrence relation
- Devising and using a recurrence relation
- Finding the limit for a recurrence relation

Trigonometry

- Solving trigonometric equations & in context
- Trigonometric identities and using them to prove $LHS = RHS$
- Addition Formulae & applications of
- Double Angle formulae & applications of
- Finding the points of intersection of two trigonometric functions
- Work in degrees and radians

Quadratics

- Sketching graphs of quadratic functions
- Identifying max, min + pt of quadratic functions from completed square form of quadratic
- Solving quadratic equations
- Solving quadratic inequations
- The discriminant and its uses with respect to identifying types of roots
- The intersection of a parabola and a line and the use of the discriminant there
- Using the discriminant to find unknown coefficients of original quadratic function

Polynomials

- The definitions of degree, coefficient, root
- Synthetic division
- Remainder theorem and factor theorem
- Factorising polynomials
- Solving polynomial equations (and use of in context e.g. curve sketching)
- Identifying a polynomial function from its graph
- Finding approximate roots using iteration

Integration

- Know how to integrate basic functions
- Know how to evaluate definite integrals
- Calculate the area under a curve using integration
- Calculate the area between two curves, using integration
- Solve differential equations