

MATHS 108, 2006, Assumed Background Knowledge and Skills.

Algebra

Manipulation of algebraic expressions, including expanding brackets and factorising, division of a polynomial expression by a linear expression. The remainder theorem and the factor theorem. Understanding indices including negative and fractional indices. Knowing the definition of the logarithm of a number and the elementary properties of logarithms. To be able to use a scientific calculator to evaluate logarithmic functions and exponential functions. Solving of equations including linear, quadratic and already factorised cubic and higher degree equations. Formation and solution of linear equations and simultaneous linear equation systems with 2 equations in 2 variables. Solving of simple logarithmic and exponential equations. Solving of simple linear inequalities. The absolute value function. Ability to sketch graphs of linear functions, quadratic functions, higher degree polynomial functions given in factorised form, rectangular hyperbolae, circles with centre the origin, exponential functions of the form $y = a^x, a \in N$ and logarithmic functions of the form $y = \log_a x, a \in N$. Arithmetic and geometric series including the idea of the sum to infinity. Sigma notation.

Coordinate Geometry in two dimensions.

Given two points, to be able to find with respect to them, the midpoint of the line segment joining them, the distance between them via the theorem of Pythagoras, the slope of the line joining them, and the equation of the line joining them. Parallel and perpendicular lines. Given two lines, to be able to find their point of intersection or to discuss its non-existence.

Trigonometry

Definitions of sine, cosine and tangent of angles. To be able to solve right-angled triangles. Knowledge of the graphs of the sine, cosine and tangent functions. Periodicity. To be able to solve simple straightforward trigonometric equations. Radian measure, arc length and sector area. To be able to use a scientific calculator to find trigonometric functions and their inverses.

Calculus

Differentiation and integration of simple polynomial expressions. To be able to use differentiation to find the equation of the tangent line and of the normal line at a point on the graph of a function. To be able to use integration to find the area under the graph of a function. The natural logarithm function $y = \ln x$, and the fact that $\frac{d}{dx} \ln x = \frac{1}{x}$. The exponential function $y = e^x$, and the fact that $\frac{d}{dx} e^x = e^x$. The anti-derivative results which follow from these.