

Suggested topics for Research Skills

Below are some possible project topics, classified in several groups, but otherwise in no particular order, for the benefit of students who are undecided about their choice of topic.

Ancient maths

Ancient Egyptian mathematics
Babylonian mathematics
Knowledge of Pythagoras' theorem before Pythagoras
Comparison of the ancient Egyptian and Babylonian number systems
'The Sand Reckoner' by Archimedes
The Chinese 'Nine Chapters on the Mathematical Art'
Apollonius and his work on conics
Zeno's paradoxes of motion and their resolution

Geometry

Archimedes and his contributions to geometry
Euclid's 'Elements' and his attempt to axiomatise geometry
Controversies over Euclid's 'parallel postulate'
The problem of squaring the circle
The problem of doubling the cube
Gauss' contribution to geometry
David Hilbert's axiomatisation of Euclidean geometry
History and development of non-Euclidean geometry
Riemann's contributions to geometry

Algebra

Al-Khwarizmi's contributions to algebra
Omar Khayyam's contributions to algebra
Cardano's solution of the cubic equation and his dispute with Tartaglia
Contributions of Rafael Bombelli to algebra
Galois and his contributions to algebra
The prime number theorem
Irrational and transcendental numbers
The fundamental theorem of algebra

Applied maths

Kepler and his laws of planetary motion
The Enigma cipher and its cryptanalysis
History and development of the RSA cryptosystem

Contributions of the Bernoulli family to probability theory
Pascal's contribution to probability theory
Historical development of the method of least squares
Development of practical statistical tests
Maxwell's discovery of the laws of electrodynamics
Lorentz transformations and the birth of special relativity
The contributions of Henri Poincare to mathematical physics
Development of modern fluid dynamics
The calculus of variations and its applications

Miscellaneous

The origin of our standard mathematical symbols
The 'Arithmetica Infinitorum' by John Wallis
Newton vs Leibniz: the great debate over the invention of calculus
Newton's 'Principia'
Fermat's contributions to number theory
Gauss and his contribution to number theory
Johann Bernoulli and the brachistochrone challenge
Fourier and his contributions to mathematics
Cantor's development of set theory
Cantor's continuum hypothesis and its current status
John Napier and the development of logarithms
Cauchy's contributions to complex analysis
The Riemann hypothesis and its current status
The Millennium Problems and their current status
John Nash and his contributions to game theory
Hamilton's discovery of quaternions
Russell and Whitehead's 'Principia Mathematica'
Ramanujan's discoveries
The monumental Bourbaki publications and their influence
A survey of Hilbert's 23 problems of 1900
Hilbert's 7th problem and its solution
Hilbert's 10th problem has no solution
Mathematics in art: Da Vinci to Escher
Mathematical games and recreations
Mathematical puzzles
Mathematics and music
The four-colour theorem
Gödel's incompleteness theorems
Henri Lebesgue and the Lebesgue integral
The Rubik's cube group
Orthogonal polynomials
Partitions of natural numbers
The travelling salesman problem

Neural networks

Population dynamics

Chaos in dynamical systems

Fractals