

ADITYA GUPTA

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EDUCATION

The Cathedral & John Connon School

IB Diploma Programme

Cambridge IGCSE: ICE Distinction, 9A* and 1A in Board Exams

Mumbai, India

July 2025 - June 2027

July 2023 - June 2025

STANDARDIZED TESTING & ADVANCED PLACEMENT EXAMS

- **SAT:** 1540 (Math 800, EBRW 740).
- **AP Examinations:** Calculus BC - 5 (AB Subscore: 5); Environmental Science - 5 2026
- **AP Examinations:** Microeconomics: 5 2024
- **AP Scholar Award** 2026

ACADEMIC HONOURS & AWARDS

- **Outstanding Cambridge Learner Award:** Top in World Additional Mathematics 2025
- **ICE Distinction** 2025
- **Honours Prize for Academic Excellence** in Grade 9 and 11 2024, 2026
- **Subject Prize:** Mathematics AA HL, Physics HL, and Chemistry HL 2026
- **Subject Prize:** Additional Mathematics, International Mathematics, and Business Studies 2025
- **Subject Prize:** Additional Mathematics and International Mathematics 2024
- **AMC 12:** Certificate of Excellence 2025
- **AIME:** 8/15 2026
- **University of Waterloo:** Euclid 2026 (Distinction), Hypatia 2026 (Distinction), Canadian Senior Mathematics Contest 2025 (Distinction).
- **UKMT Senior Mathematical Challenge 2023:** Silver Award.
- **International Chemistry Quiz:** 2023 (High Distinction); 2025 and 2026 (Distinction)
- **AMC 10 (Nov 2024):** First in School.
- **Cambridge Science Competition 2024:** Gold-Level Certificate.
- **CREST Gold Award, British Science Association:** FloodGuard; Level Sensor Placement in Stormwater Networks

MATHEMATICS FOR ENVIRONMENTAL SCIENCE

Research Intern, The Guha Lab, University of Chicago Trust in New Delhi

May 2026 – Present

- Water-2-Cloud Research Group under Dr. Supratik Guha and Dr. Srinivasa Balivada
- Co-authoring a paper on optimising the distance for interpolation in rivers of India. Built machine learning models, spatial algorithms, and interpolation algorithms to analyze sensor-based data about water-quality.

Research Intern, IIT Bombay, Centre for Machine Intelligence and Data Science (MInDS)

June 2026 – Present

- Centre for Machine Intelligence and Data Science under Dr. Asim Tewari
- Co-authoring a paper on the Vehicle Routing Problem to minimise carbon emissions and costs for quick-commerce logistics. Developing optimization algorithms to minimise carbon emissions of trucks, delivery bots, and 2-wheelers.

Sensor Network Placement Optimisation for Urban Flood Resilience

February 2026 – May 2026

- Published in American Journal of Student Research
- Developed a mathematical optimisation framework for level-sensor placement in sewer networks using real-world GIS and water-systems data to improve flood prediction and infrastructure resilience.
- Applying exact and heuristic algorithms; combining network-based graph modelling, geospatial analysis, and combinatorial optimisation; outputs could directly inform municipal flood policy.

ENVIRONMENTAL SCIENCE & RECYCLING PURSUITS

Founder, 21 Million Green Bombay (21M GB)

Sep 2025 – Present

- Founded a social enterprise addressing e-waste awareness and recycling in Mumbai; partnered with Recyclekaro for responsible e-waste disposal. Spread awareness to over 7500 individuals.
- Collected over 2500 kgs of e-waste through various collection drives across neighbourhoods in Mumbai to ensure proper and safe disposal of e-waste.
- Authored 2 Children's books: Meera's Mountain of Mobiles and Gizmo's Second Life
- Designed Factsheets to outline the dangers of improper e-waste disposal, household and community-level e-waste disposal practices, and actionable information for e-waste disposal in Mumbai.

Head of Engineering, Mathematical Modelling, and Data Analysis, FloodGuard

Jan 2026 – Present

- Deployed by the Brihanmumbai Municipal Corporation
- Leading design for a low-cost, scalable sensor device for real-time sewer-flow monitoring during extreme rainfall events.

- Conducting bench tests to calibrate sensor thresholds, the logic for automated alerts, and setting up the main dashboard
 - Coded the microcontroller and contributed to conceptual design, environmental problem analysis
- Intern, Tata Power - Hydros Division** May – Jun 2026
- Used math modelling and interpolation to model flow, discharge, efficiency, and understanding working of hydro plant
 - Field exposure across hydroelectric plants; studied reservoir, inflow, and generation operations and field instrumentation.
- Research Intern, RecycleKaro (Evergreen RecycleKaro India Ltd.)** May - Jun 2025
- Shadowed R&D operations and gathered process data on metal-recovery yields (Li, Co, Ni) and mapped material flows, analysed efficiency improvements post-expansion, and researched mathematical-modelling approaches for recovery.
 - Authored report: “Mathematical Perspectives on Sustainability: Metal Recovery Efficiencies at RecycleKaro.”
 - Helped Develop app “Reloop” that allows to easily get rid of e-waste. Currently collecting 200 tonnes per month

MATHEMATICS: EXPERIENCES AND RESEARCH

Research

- Quadratic Diophantine Equations & Pell's Equations** November 2025 - April 2027
- Investigating Quadratic Diophantine Equations, modular arithmetic, and Pell's equations through proof-based analysis.

Advanced Coursework

- UC Berkeley Extension Program (Credit-Bearing)** Jun – Dec 2025
- **Calculus I:** Limits, derivatives and Integration techniques. Final grade A

- UC San Diego Extended Studies (Credit-Bearing)** April - June 2026
- **Multivariable Calculus:** Vectors, Partial Derivatives, Double Integration and its applications. Final Grade A

- Stanford University-Level Online (ULO)** June - December 2026
- **Linear Algebra:** Matrices, Linear Equations, Vector Spaces, Eigenvalues, Eigenvectors. Final Grade A
 - **Modern Algebra:** Groups, Rings, Fields, Constructibility, and Matrix Groups

- Johns Hopkins CTY** May 2023 – Feb 2024
- **Honors Algebra I:** final grade A–. Completed 11 unit tests, midterm, and final exam.

Academic Programs

Euler Circle - Mathematical Thinking: two terms; proof-based problem-solving (September 2025 - June 2026).

Euler Circle - Mathematics in Lean (July - August 2026).

Program in Algorithmic & Combinatorial Thinking (PACT): (Summer and Year-long program - June 2026 - Present)

Leadership

- Cathedral Mathematics Society** August 2025 – Present
- Secretary March 2026 - Present
 - Grew Membership from 30 to 100+; Founded and managed the ‘Problem of the Week’ website, 40+ problems and 150+ weekly users; led competition training for younger students
 - Editor in Chief for *Mathematica* (school mathematics magazine): 2 editions published and 15+ articles.

Outreach

- Volunteer, The Toybank Project (Opentree Foundation)** Aug 2025 – May 2026
- Teaching STEM fundamentals to children from low-income communities through play-based games and puzzles.

SCHOOL LEADERSHIP

- Full STEAM Ahead (Science Club)** June 2022 – Present
- President March 2026 - Present
 - Grew member count by 30% from 130 (2025) to 170 (2026)
 - Organising committee, Cathedral Mathematics Competition (CMC) - international competition with 5,000+ annual participants: designed 200+ questions, Inquiries Manager for 3500+ people, Discord Administrator, Outreach Manager (Scaled participation from 2,500 to 5,000+); designed a new website to streamline operations.
 - Co-organised CATHCON (interschool CS competition) and Inquest 2025 (Cathedral Science Fair): Head of logistics and outreach; designed 10+ questions; Discord Administrator for over 200 participants.
 - Conducted 5+ workshops to junior students introducing them to Novel STEM ideas including polygons and electrolysis
- Head of IT, Charges d’Affaires Cathedral Model United Nations** Dec 2025 – Aug 2026
- House Monitor, Savage House** March 2026 - February 2027
- Head of Social Media, Encore** (Annual Charity Concert that raised ₹7,81,000) November - December 2025

TECHNICAL SKILLS

Programming: Python - data analysis, mathematical modelling, optimisation; Pandas, NumPy, GeoPandas, NetworkX.

Tools: LaTeX, Excel, Lean

Domains: Applications of computational methods and mathematics to real-world systems and the environment; Optimisation; Algorithms; Numerical Methods; Discrete Mathematics; Combinatorics