Mathematics is deeply interconnected, and that is why I adore it.

When I first started reading “Linear Algebra” by Serge Lang, it seemed weird why “Coordinate geometry 2.0” would be a cornerstone of modern mathematics. However, the lack of pre-requisites allured me to continue reading. As no matter how difficult the material may become, I could always fall back on the basics and re-read the text.

At first, tedious proofs about linear combinations were dreadful to read. Constant usage of mathematical induction was also difficult to follow. Abstract definitions and theorems also prevented me from thinking geometrically. I had to rely on examples to strengthen my thought. However, as time went on, I realized that abstractness was in fact the greatest strength of linear algebra.

For example, I realized that differentiation and integration were linear. Operations that I once thought were so complex and intricate, would surprisingly be similar to a linear transformation. Recurrence relations which seemed to spiral out of control could also be studied using eigenvectors and eigenvalues.

Linear algebra was also crucial to my understanding of abstract algebra. With a vast example bank in linear algebra, I could think about abstract concepts much easier. For example, vector subspaces proved to be excellent examples for quotient groups. I could imagine filing up the 3D Cartesian space with lines or planes. Theorems in abstract algebra also often have analogues in linear algebra. For example, the isomorphism theorems corresponded with the rank-nullity theorem in linear algebra.

Linear algebra was also helpful to grasping applied mathematics. For example, in coding theory, linear codes exploited the efficiency of matrix multiplication. In quantum mechanics, matrices could be used to describe the measurement of spin states. Ultimately, knowledge in linear algebra enabled me to pursue various topics and fields that were previously inaccessible.

I have also enjoyed exposure to other forms of mathematics, with the Enrichment Program of the Chinese University of Hong Kong standing out as being particularly fruitful. During the three summers I spent there, I studied Number theory, Differential Geometry and Non-Euclidean geometry. It was particularly thought-provoking to be taught by undergraduates in the tutorials. While their presentation may not be as precise, the tutorials were more flexible, interactive, and personal compared to traditional lectures.

I also enjoy presenting mathematics. During my presidency in my school's mathematics society, I launched a collaborative project to write a 70-page mathematics journal using LaTeX. I mainly wrote about the basics of linear algebra and its applications in physics. I also keep a blog running on GitHub pages to hopefully explain mathematical concepts that I have once found difficult. I realized that teaching and formulating mathematical notes reinforced my mathematical knowledge and exposed some of my deep-rooted misconceptions.

Learning mathematics through other fields has also been invaluable. As a finalist in Hong Kong Olympiad in Informatics, I also got the first taste of graph theory through competitive programming. As the overall champion in the Joint School Science Exhibition, it was the first time I have ever used LaTeX to write lengthy expository materials. It subsequently boosted my confidence in LaTeX and enabled me to pursue larger projects such as writing the Mathematics Journal.