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Final Report

AwesomeMath Elements of Geometry + Math Counts with Proofs

Serving as an excellent resource in strengthening my mathematical problem-solving skills, AwesomeMath has hammered in the basics while simultaneously introducing me to more advanced topics. Providing a plethora of problems, pleasant teachers, and a community consisting of people all across the globe who desire to improve themselves daily, this summer program will continue to remain a highlight of my year. One might question why anyone would spend a considerable amount of time and effort in learning another theorem or practicing another problem set, especially since it seems that all of this effort goes to waste in a real-world setting. However, AwesomeMath has been keen on emphasizing that while teaching mathematics can help students increase competition scores, their true focus lies in sharpening logical reasoning and grit in tackling tough problems, both of which were heavily utilized throughout my time here in my two classes *Elements of Geometry* and *Math Counts with Proofs*. Regarding my choice of these two classes, geometry has always been a favorite subject of mine, while combinatorics is one that I have always felt the need to brush upon.

As mentioned in my previous reports, *Elements of Geometry* starts about mid-morning and makes its way to a bit past noon. Since it was the last week, our instructor decided to explore a bit more advanced topics than a typical geometry course would cover, such as vectors and

homothety. Yet, even with the heavier concepts presented, both the teacher assistants and the instructor were well equipped to present them in a manner that built upon the ideas we had already examined. Stopping periodically for questions, they were able to address all of our issues before venturing on further. Patrick has been a wonderful teacher to have, as his enthusiastic attitude is a highlight of the class, perfectly combining with his proof-oriented approach to teaching. Overall, this last week of class has only further solidified my respect for both Patrick and the other adults who make these classes possible, as their passion for mathematics has continued to inspire me.

Regarding my counting class, the topics mentioned this week have fully surpassed what I have previously known. So far, I have been able to relate at least most of what was being taught to something that I had previously heard. Graph theory and generating functions were two concepts that I had always thought of as being separate in their respective fields, having no influence on combinatorics. However, this week has proved this wrong as they have become powerful tools that I have grown to appreciate, particularly in problems that would require brute force methods. These two ideas have been useful in providing an alternate solution to problems that we had previously seen in the first two weeks, albeit they are much more efficient.

Social activities have also been present throughout the last week, including Gartic Phone (a silly drawing game), Mafia, and Math Trivia. Attending these activities helped me to focus on something else than mathematics for a bit and it was fun collaborating with other people on a common goal. While I was unfortunately not able to win anything, the events were nevertheless fun to attend.

And while we could meet new people through these online games, most of my interaction with peers was held primarily on the AwesomeMath Discord server. It was here that

announcements were made, as well as a place where people could post homework problems that they needed help on. In general, it was a space where everyone could bounce ideas off each other if necessary.

The Garwin Family Foundation has provided me with an amazing opportunity, as the knowledge I have gained, friends made, and the well-written handouts will continue to serve as resources that will further my competition mathematical abilities. Such a summer program has allowed me to pursue what I enjoy the most and will be one that I remember indefinitely. Thank you once again GFF for this wonderful experience!