

Draft 4

Question 1(1231 characters) - Why do you want to study this course or subject?

The experience of a mathematician is, in my view, what shapes their approach. I see this in my own maths class, where my peers approach problems in very different ways based on their experience-built preferences. This led me to consider how this is also shown in more famous examples, such as Newton and Leibniz's work on derivatives. Despite reaching the same mathematical conclusions, their unique experiences fundamentally changed how they viewed, communicated and applied their work to their respective fields. This has led me to the conclusion that experience and context, and the desire to always find new experiences, are some of the few things that can create a distinguished mathematician.

I also deeply enjoy developing my own style of clear, concise communication, as well as collaborating with people in my field. To best communicate my ideas in today's online world I decided to learn the LaTeX typesetting language, allowing me to digitally share my ideas and approaches to a range of different problems. I found this especially useful when working with my peers on longer problems containing vectors or matrices, as the techniques used to solve them are more difficult to convincingly reason with conventional text.

Question 2(1835 characters) - How have your qualifications and studies helped you to prepare for this subject?

Geometry is a topic that I find particularly intriguing. My interest in this field began in Computational Geometry, with a focus in how small inefficiencies in algorithms like physics engines could exponentially increase their required processing times. Seeing these different engines then inspired me to create my own bacterial growth simulation using Object Oriented Python.

It was in formally learning about 3D vectors and planes that my interest in the maths behind geometry was ignited. Through my classes, I saw how the scalar product could make my simulation more realistic by introducing partially elastic collisions. This confirmed my preference for conceptual learning over implementation into code and helped me realise why I do not want to apply for either Physics or Computer Science.

Edward Abbott's Flatland was both the foundation for my further learning around geometry, and an incredibly entertaining social satire of his time. I found the most impactful part of Flatland to be the characters' scepticism towards any dimensions higher than theirs. After having empathised with their perspective I saw how wonderfully unsettling it is to even think that we can, at any moment, be watched from an entirely unseen direction. This realisation deepened my appreciation for the complexity of geometry, and made me start researching how we interpret a 4th dimension. In my research I focused on how a 4th dimension is

applied in linear algebra, imagining a 4th dimension(w) as another direction used to describe location, as opposed to time. By thinking of the direction w conceptually, I was able to draw a parallel in how a 4D shape might be projected into our world; the projected image of a 4D shape being transformed by its w value, similar to how the shadow cast by a solid would change as its light source moves.

Question 3(855 Characters) - What else have you done to prepare outside of education, and why are these experiences useful?

In my free time, I enjoy following the different YouTube videos that 3Blue1Brown posts, as he covers a perfect blend of mathematical and Computer Science based content. I especially loved his work on lying with visual proofs as they showed me the importance of being clear and explicit in my communication, whilst also showing the illogical consequences that even a single piece of implied information can have on its results. I have also regularly attended a selection of different online workshops, where different Universities would give taster lessons on topics like the Pigeonhole Principle, and how it can be used to find guaranteed repetitions in groups. Whilst I did find the content in these sessions thought provoking, I primarily enjoyed being able to work alongside other people who were just as invested in the field of mathematics as I was.

Character total breakdown:

Question #	Character Total	Running total
Question 1	1231	1231
Question 2	1835	3066
Question 3	855	3921