1 Introduction

Many notable things have happened in the last month: most importantly (to me), I turned 18, and my last math contest passed. These events mark the end of my childhood in more than one way, and I feel that now is an appropriate time to reflect on my experiences thus far.

I come from a school no one's ever heard of, a school that prioritizes science over math and research over Olympiads. Still, math has been an important part of my life for almost as long as I remember. Years ago when I embarked on this journey into the world of math competitions, I never imagined where I would end up — I could not have anticipated the things I learned, the passions I built, and the truly amazing people I met. Looking back, I wonder if the me of four years ago would even recognize the person I've become.

2 AMC8 and MathCounts

My first foray into mainstream math competitions was in sixth grade. At my middle school, the AMC8 was offered to all advanced Algebra I classes, and so I was roped into the contest with no problem solving experience besides the Chinese workbooks my parents forced me through in elementary school. My score of 19 ended up being the highest in the class, and as a sixth grader in a crowd of eighth graders this earned me extra attention from my teacher. I didn't take the results very seriously, though; all I knew was that the praise and respect from my classmates felt good.

That year, one of my teachers learned about MathCounts and started a school team. We met a few times before the competition, doing practice sets from the MathCounts handbook, but nothing much was learned at these meetings aside from the format of the contest. At Chapter, somehow I did well enough to qualify for States, where I was quite inspired by the speed of the Countdown participants and resolved to make Nationals eventually. However, having constantly been told by my teachers that I was "good at math", I arrogantly assumed that my place on that team would only be a matter of time and would not require any additional work.

The most math I practiced in seventh grade was maybe one or two AMC8s before the test; the rest of my time was wasted on computer games as my parents finally gave me access to the desktop. (They did insist that I do 2 hours of math a week, but my younger self thought that sounded like too

much work and paid no attention.) When my AMC8 score increased to 22, I was convinced that I didn't need to do extra practice and that further improvement would come naturally with age. I took the AMC10 and got a sub-100 score, but I didn't particularly care because by my logic, next year was guaranteed to be better.

But at MathCounts Chapter, my test performance was abysmal. Not only did I fail to make States, I placed 11th overall and missed Countdown while a sixth grader from my district came close to States. That was the first time I cried over a math competition, and from then on, I realized that I would have to put in some real effort to reach my goal of making Nationals.

3 Eighth Grade

In my final year of middle school, I practiced all the AMC8s, worked through the entire MathCounts handbook, and took a few past AMC10s along with all the past MathCounts tests I could find online. Miraculously, this was enough for a perfect AMC8, a third place Chapter finish, and an AIME qualification. Then came States and the nerve-wracking wait for Countdown participants to be called in reverse order — I desperately feared coming in fourth, because I knew my chance of winning any CD round was exactly 0. Coming in fifth, one step away from my biggest dream at the time, seemed like the end of the world. (Clearly it is not, the person who *did* actually come in fifth that year is now extremely accomplished in math contests and far ahead of where I am.) But to my relief, the written rounds placed me in third, and I was automatically given a spot on my state's Nationals team.

I never had formal, effective math practices before, but our state coach held weekly sessions where my teammates and I could discuss problems and share ideas. This was completely new to me, and from these practices I learned a lot of standard tricks I'd never heard of before (Heron's, stars and bars, recursion, etc). I watched videos of past MathCounts Nationals rounds and was amazed to discover someone had gotten a 14 on AIME - compared to my score of 3, that number was *godly*.

In Florida, I watched from the crowd as many well-known names in middle school math competitions (AoPS favorites to win) walked onstage for Countdown. Though we were all at Nationals, I felt a world of difference between them and me: they were accomplished contestants with high levels of experience, and I was an average kid from a state that rarely even placed in the top 10. How did we end up in the same place?

But there at Nationals, for the first time I was able to talk to and connect with people with similar interests as me. My school was proud that I was participating in math competitions, yes, but I constantly felt a disconnect with my peers — they just couldn't understand that these contests were actually important to me. Unlike with my MathCounts teammates, I couldn't discuss any of my ideas with my classmates and had to restrict myself to mundane middle school drama for conversation. At Nationals, it was fine to openly talk about math and do nerdy things, and I gained quite a bit of exposure to the math community there. (My team even met Po-Shen Loh and got to talk to him for a bit.)

I consider the spring of eighth grade to be the true start of my competition math career. My state coach introduced me to features of AoPS aside from the wiki and recommended the AoPS books to me, and starting in April I worked on those regularly. I began bringing math books to school (earning even weirder looks from my friends) and continued studying even after MathCounts ended, knowing that the AMC series would be my main focus from then on.

4 Moving

In the summer after eighth grade, my parents informed me that we would soon be moving out of state. I was crushed by this news. My family had been living in the same area ever since first grade, and it carried so many of my memories — all of my friends lived nearby, I loved my school district and enjoyed visiting my old teachers, and for my little sister it was quite literally the only home she had ever known. I didn't want to leave, didn't want to make new friends — but I think a significant, though not the largest, part of my reluctance was my fear of losing the intellectual reputation I had built for myself at school. In my old district, everyone recognized me as the top math student in the grade, and I was afraid that my parents' warnings that I was only a "big fish in a tiny pond" would prove true with competition from new peers.

Despite my sulky anger towards my parents and my adamant refusal to leave, we still moved in the middle of ninth grade. At my new school, I decided that a lack of friends could be a good thing: at the very least, it would allow me to focus on studying and math competitions with minimal distractions from social factors. For the first few months, I refused to talk to basically everyone at school, instead texting my old friends all day, burying my nose in an AoPS book, or doing AIME problems on my bio notes. I handled loneliness by escaping to math, and I guess it worked? My

AIME score jumped up to 8, just barely putting me over the edge for a JMO qualification.

Absentmindedly reading through the USA(J)MO manual for the first time, I saw something that cleared my brain from the slow fog of lethargy that had clouded it for months: if I did well enough on JMO, I could make MOP, which was to be held *in the city I had just moved from*, where all of my friends and everything I cared about still was.

My JMO score that year was a measly 8, definitely not enough for MOP. I spent a week or so being upset about it, the chance to revisit old friends just slipping out of my grasp, but I firmly believed that returning to my hometown the following year would not be too late. So I set out to make MOP with no more than *the outrageous motivation of seeing old friends again*, friends who probably would have forgotten me by the time the following June came.

5 JMO

In hindsight, this was childishly stupid and downright ridiculous. I wanted to go to this prestigious, highly coveted camp not for any of the usual reasons, but merely for the chance it offered to take a trip to Pittsburgh. Just begging my parents to take a summer vacation there would be easier! But this was my motivation everyday, what forced me to get up in the morning and work on math no matter how much I wanted to do something fun or take a break. Throughout tenth grade, I was doing a minimum of 3 hours of math a day and a maximum of up to twelve hours per day on weekends/school breaks. (Seventh grade me thought 2 hours a week was a lot, imagine that!) I reviewed and worked through my AwesomeMath notes from the summer, mocked every JMO in existence, and spent countless hours on WOOT handouts, homework, and practice olympiads, attempting as many problems as I could. I practiced JBMOs because I heard somewhere that they were good introductory olympiads, attempted Math Prize Olympiads, and dug up handouts online that I was completely unable to understand. *All of this for just the hope that I might see some childhood friends again,* but during this year of work I did manage to start building a true passion for math that stretched beyond the enjoyment I felt at performing well on contests. It was impossible not to, when I was spending as much time on math as I did. I found there was indescribable satisfaction in finally cracking a problem after hours of attempts, and I discovered that there really was a beauty to short, elegant proofs. My favorite thing about math, even now, is that very simple ideas can often be used to solve very

difficult problems, if only applied creatively and ingeniously. The best thing about Olympiads is that high-power techniques are really not necessary for solving problems (except in weird edge cases — polynomials with derivatives seem to be common lately). Math is not about numbers or equations; it is a way of creative thought, of problem solving and using old ideas in innovative ways.

Because of my mandated 3+ hours of contest math per day, my sleep schedule finally started resembling that of other high schoolers, and for the first time in my life I began falling asleep in class. Either that, or I would openly use the back of worksheets as scratch paper for whatever olympiad problem was in my head at the time; my grades stayed fine, so my teachers didn't particularly care. I learned to be efficient with my time, and I soon realized that school classes had very little to teach me — in general, I could learn all the material on my own much faster. Every spare moment had to be dedicated to math in some way, or else I felt like I was wasting time — taking a page out of Holden Lee's story, which I revisited quite often that year, I stopped doing everything I used to do for fun and shut myself in my room for hours at a time, resisting anything that could potentially distract me from making MOP.

Day 1 of the 2016 JMO was incredibly stressful for me. I knew that geo was my strong subject, so I was terrified when an hour had passed and I still hadn't solved problem 1. Eventually I managed to create a convoluted solution with similar triangles, so after writing it up I hurriedly moved onto problem 2. I didn't even consider reading problem 3, because a) it was combo, my weak subject, b) it had notation, c) it was a number 3. So I spent the remainder of my time on problem 2, finding and writing down a bunch of bounds that would make the problem work, and in the last five minutes somehow I found a number that satisfied my inequalities. I hastily wrote it down and said something like "you can show this works using totient function and mods", barely getting the sketch down before time was called. I came out of that day expecting 7/2/0 max.

Day 2 went much smoother: problems 4 and 5 didn't take very long combined, so I had a lot of time to tackle problem 6. Unfortunately, I was not very skilled with FEs, and though I recognized pointwise values and found the correct solution set, I was not able to come close to a correct solution.

After the test, I expected something like a 7/2/0/7/7/2 for 25 total. I spent days worriedly checking AoPS, but my parents had arranged for our family to go on a cruise soon after JMO so I lost internet connection for a week. I was quite frustrated and feared that I would just miss being a JMO winner,

but APs were coming up and I distracted myself with studying for those on the ship instead. (The cruise was also nice, but I needed to fill my brain with something.)

I wasn't sure exactly what day JMO scores would come out, so I was highly nervous all throughout the first week of APs. By Thursday, I gave up on studying for AP Euro and just took the test on Friday intending to leave as quickly as possible. On the bus ride home, I was refreshing AoPS (again) when suddenly a post popped up with a list of Olympiad scores. I did a double take when I saw a 29 next to my ID: I was expecting a 25, maybe a 28 max, so how on earth was it possible that I got a 29? (My solution to problem 2 counted as a full solution so my distribution was probably something like 7/7/0/7/7/1.) I also knew this would shift my placement on the AoPS winner predictions, so I returned to the forum and saw a post with a link to the list of winners. I was beyond ecstatic when I saw my name on there, but I was forced to contain myself because I was still on the bus. The official invitation to MOP arrived a few minutes later, and when I got home the first thing I did was to tell all of my Pittsburgh friends and ask when in June they would be available to meet up (these priorities...).

6 MOP

The day before MOP, I did get to see some of my old friends, although not that many showed up. I enjoyed their company, but at this point my attitude had also changed slightly, and I was quite excited about going to MOP and meeting all of the amazingly smart people I'd only heard of before (IMO medalists, Math Prize high scorers, the MathCounts champions from a few years ago; all of the people I looked up to would be there). I was intimidated by the sheer brainpower of everyone at MOP and feared I wouldn't fit in there — I was just some random kid that somehow managed to win JMO by sheer luck.

For much of my life, I defined myself by my interest in math, and at school this was enough — no one else was crazy enough to do extra math "for fun". At MOP, everyone satisfied this definition — what made me different from them then? Clearly we weren't the same person, but was I really anything other than a strict subset of their capabilities? Anything I could do, someone at MOP was guaranteed to do better.

But MOP 2016 surpassed all of my expectations. I quickly befriended the other girls through countless games of hearts and apple sharing, and though the classes were hard, we were able to work through handouts together and

learn from each other. If we couldn't figure things out, we frequently pestered other MOPpers for help — maybe this is how the midnight inversion lecture with Evan happened? As a team, we could play off each other's strengths and combine our brains quite synergistically to solve problems. I learned as much (or even more) from my friends during our short problem solving sessions as I did from the actual classes. This was my first positive experience with group work, and thanks to Facebook these successful group efforts continue today.

When we weren't doing math, we came up with other games to play that were both fun and showed off our nerdiness (the latter didn't always come through though). The atmosphere at MOP was quite non-competitive, and there was complete mixing of people from Black, Blue, and Red MOP. Everyone was willing to help and spend time with everyone else, and when we played games such as Sardines nearly half the entire camp joined in. The people I once thought of as math gods (though they are *incredibly* good at math) proved to be quite normal people, even consenting to hide-and-seek, foosball, and ridiculously silly curfew evasion with us mere mortals.

We heard stories about past MOP culture and created our own inside jokes for 2016. The community that year was extremely close-knit, and though I don't know as much about pre-2016 years, it seems to me that this is not the norm. Something was different that year; everyone left MOP feeling a sense of belonging and wishing we could go back to the first week and do it all again. (I didn't feel this in 2017 — instead I was exhausted and wanted to go home and rest, but I can't speak for anyone else.) In 2016, we watched movies in the second floor girls' lounge the weekend of TSTST, hid in cardboard boxes and under glass tables, ran into the bathroom and to the base of the stairwell to evade curfew enforcers, successfully chopped a watermelon with our bare hands, and shared so many memories that our collective folder of photos doesn't even begin to cover. Where else could I repeatedly chuck markers at a whiteboard, normalize foosball scores, or count exclusively in Sandcastle?

Even now, I consider MOP 2016 to be one of the best experiences of my life. Ironically, it was there in Pittsburgh that I got over moving away from Pittsburgh, but all of that was thanks to the amazing people I met in the summer. It was at MOP that I started learning who I am as an individual outside of math. It was at MOP that I made the best and most lasting friendships I've ever had, becoming so close to them that today I'm proud to call them my family. It was at MOP that I finally found something permanent.

7 Junior Year

Returning to school after MOP and Mathcamp was rather annoying. No longer could I see my friends daily and discuss a variety of intellectual topics with them whenever I wanted, and instead I was forced to listen to the constant, meaningless babble of "grades college test project grades test club homework COLLEGE" at school. Fortunately, thanks to Facebook and Skype (and computer teleporters) we were able to keep in contact quite regularly. I had people to call after every TST (even though I didn't make TST group, all the girls still took TSTs for EGMO selection) and people to message to work on problems together. I was still spending a lot of time on math, trying to maintain the 3+ hours everyday, but I was already starting to shift my focus from math competitions to my friends. We learned a lot about each other's lives outside of MOP during this time, and our conversations frequently lasted for hours. Whether I was having a good day or a bad day, they were the people I turned to, and they never seemed to tire of listening to my silly antics or responding to my poking.

My best friend suggested that I apply to teach at A* math camp over break. This was a great opportunity for a mini-reunion with MOPpers in SFBA, and it resulted in the happiest Christmas and New Year's I've ever had. After hearing about the A* Hilbert class that week, I expressed my regret that I would not be able to attend it since I lived on the other side of the country — little did I expect that my friend would actually arrange for me to Skype into the sessions! This let me set aside two hours every week during which I could work on math face-to-face with some of my closest friends, just the way we did at MOP.

In eleventh grade, I worked through Evan's geo book, started on US TST problems, read through recommended chapters of Problems from the Book, and practiced some ISL after being introduced to it in Hilbert. Because of excellent geo placement on TSTs, I made it onto the EGMO team and did several past contests in preparation for that; I was extremely nervous, since the 2017 team was a completely new batch of people after the strong 2016 team graduated. I was also the least experienced by far on the team, but fortunately the test seemed as if it was written with our strengths in mind. Our scores were 42/36/36/34 for a total of 148, and we were the first team to ever receive 4 golds at EGMO with a record high team score. When we returned, we had only a week or so until USAMO — and this is when my brilliant year came crashing down. I failed to solve Evan's P3 geo during the test due to my incompetence with ruler and compass constructions, and though I solved P4 it took me approximately 4 hours. After this, I was quite convinced that winning JMO, doing reasonably well on TST, and

getting EGMO gold were all just flukes — USAMO felt like a far more accurate representation of my ability than all of those successes combined.

I still made MOP, but only thanks to the Pink cutoff. For me, this was a heavy blow: I was always determined to do things legitimately, without the use of "affirmative action"-like programs that made me feel undeserving of being at MOP. I took my USAMO score pretty hard, and in the time before June I aggressively did ISL to try and improve myself. I fervently hoped to make TST group and prove that I really could be worth something.

8 Summer

The summer of 2017 was probably the last major boost to my competition learning curve. At MOP, I focused on doing past TSTST problems and working through class handouts instead of going outside to socialize the way I had previously. My roommate, another returning MOPper sharing my ambitions, and I spent a lot of time asking Evan for midnight lectures and help with hard problems. This tapered off after the first week though — we were both utterly exhausted after doing so much math, and Evan was probably tired out by us too.

Our constant work paid off: we both ended up above the TST cutoff (my roommate thought it would be funny to wake me up at 2 AM to inform me of this, but I did appreciate it). We spent the final week relaxing a bit more, engaging in a dorm-wide water balloon fight, playing badminton with Sasha, and learning to pick handcuffs. I was sad to leave, but I was not as close to tears as I was in 2016. My focus, at least for the time being, was back on math. I thought the best way to prove myself would be to make a bid for IMO. If I succeeded, I would be taken seriously by my peers, and I would definitely make a lasting impression on both my school and in the math community. Even better, I could potentially end the 10+ years of an all-male US IMO team.

At Mathcamp, I initially spent most of my time shut in my room working on MOP handouts and ISL. I focused on my weakest subject, combo, and definitely saw substantial improvement: I was up to C4s and C5s with some degree of consistency, and for the first time ever I finished every problem on a MOP combo handout. But the atmosphere of Mathcamp was infectious, eventually luring me out of my room to spend time with other campers. Mathcamp was also an incredible experience, with many fun events and interesting people whom I still talk to today. Still, the summer of 2017 was a return to math for me even if it didn't quite carry into the school year.

9 Senior Year

A substantial part of this year was spent worrying about college apps. All of my older friends from MOP 2016 were either at MIT or Harvard — what if I wouldn't be able to join them in Cambridge? Once school started, I found it significantly harder to make time for math, but taking a light courseload definitely saved me a lot of trouble. I actually enjoyed the college application process quite a bit, as I feel that it really helped me get to know myself better.

Once everything was submitted, I could relax and focus completely on math. But I no longer kept track of how long I was spending on math everyday, instead just working on ISL and TST whenever I could. It was quite a nice period of time, doing math everyday and not worrying about anything else.

I walked out of December TST believing that I had gotten swept; I spent nearly all my time on problem 1 and ended up writing down some stuff that I still doubt was comprehensible. Later that day, I found out the test was extremely hard, but that plus the fact that I actually received a 7 on P1 still wasn't enough to make me forget the sheer terror of being 4 hours into a test and having nothing solved. I thought that I improved substantially over the last 6 months, so I couldn't imagine why my test performance just didn't reflect my solve rate in practice — was I still not working hard enough? Was I inherently just not good enough? Did I start too late to compete with all of these people who had been winning Olympiads and going to MOP before I even knew MOP was a thing?

I followed some heavily suggested advice to take a break from math, acknowledging that all the time I'd spent worrying about contests really had been dragging me down. January TST went more as expected, but I was still getting increasingly tired of math. I was eager for USAMO to come so I could finally retire from math competitions, and I no longer particularly cared about my results even though I felt I should have. I think this was probably the cumulative effect of all the time spent on math over the last 2 years without ever really taking a break, so I would strongly suggest **NOT** doing what I did. In fact, it might not be bad to regularly take time away from math and still take part in other enjoyable activities; too much of anything (even math!) really can be a bad thing.

It was really hard to stay motivated from February through April, and it's definitely arguable that I just wasn't motivated at all — I think I have a very severe case of senioritis. I still managed to force myself to practice for TSTs, EGMO, and USAMO, but with my final weeks of prep time I did

more reviewing of all the problems I solved in the last 2 years than looking at anything new. My 18th birthday coincided with EGMO this year, so it was awesome exploring Italy with my team that week; we met lots of people from other countries and ate a lot of really good gelato. It was a pretty great end to my competition career.

10 Lifetime Stats

I still find this pattern to be rather funny, especially since I broke it this year:

- 6th grade: AMC8
- 7th grade: AMC8, AMC10
- 8th grade: AMC8, AMC10, AIME
- 9th grade: AMC10, AIME, JMO
- 10th grade: AMC10, AIME, JMO, MOP
- 11th grade: AMC12, AIME, USAMO, MOP, TST

One level up each year, so it would have been nice to extend the pattern this year... Nonetheless, it's been an incredible journey and I've enjoyed every moment of it.

According to my spreadsheet of 7 categories, I've done exactly 365 Olympiad problems from June 2016 until now: 26 TSTST, 64 USAMO, 26 TST, 42 EGMO, 24 RMM, 6 ELMO, and 177 ISL. This doesn't even begin to count all the foreign Olympiad problems, random exercises from handouts, or miscellaneous problems given to me by friends. Every problem has had something new to teach me, some creative new idea that helped me see more of the beauty of mathematics. Perhaps someday I will do some problem writing as well, to try and share more of that beauty with younger competitors and give back to this community.

I'm proud to say that all of my achievements are entirely my own. Though I have taken classes that taught me theory or spent brief periods exploring recognized competition programs, I have never truly had a coach to tell me what to practice or offer guidance on how to proceed. My practice schedule and motivation come entirely from me, and though in the last two years

I've been happy to work on problems with others, the vast majority of my work is solitary — just me, in my room, with a problem in front of me. Maybe I could have learned more or improved faster if I had someone else helping me, but these years have taught me to rely on no one but myself for my education. Math competitions forced me to take personal responsibility for whatever results occurred, and they placed the burden of change entirely on me. This is one of the most vital personal takeaways I've had from math contests.

11 Thoughts

Now EGMO and USAMO have passed, and since I'm positive I'm not making IMO I have the time to step away from math and share some of my experience with the community.

I am well aware that results that were disappointments for me may be excellent by the standards of the community, and I am also aware that there are many people who have worked longer and harder than I have and achieved less (though I daresay I worked pretty hard too). This story would probably be a lot more interesting if I did struggle more, and I probably would also have learned more if some of my successes were replaced by failures. Undoubtedly, the relative smoothness of my journey has influenced which lessons I have taken from math contests.

I often have conflicting thoughts between "qualifying for Olympiads/making MOP should not be that difficult" (even though objectively this seems not true; but if I can do it, can't anyone?) and "if making TST is difficult, then I probably didn't deserve to make it" (I'm an extremely ordinary person, so why should I be here when so many more talented people aren't?). A lot of times I feel threatened by the younger students in my area who are starting to push ahead in competitions. To me, it seems that as long as they work hard and stay focused, they will easily surpass me.

At some point I decided I would probably be better off not thinking about such things, instead doing math just for the fun of it. This has helped me separate my interest in math from the thrill of competition or the social rewards of being part of such a great community. While before I was unable to decide how I ultimately felt about math, now I recognize that my addiction to problem solving will draw me back to math no matter how I try to escape it. Without a problem to chew on, my brain is highly unsatisfied and simply *bored*.

It seems so weird to me that I've started receiving requests from younger students for advice on contest prep. I started out as a nobody on the bottom rung of the AMC ladder, and even now I still feel like merely one person out of millions of contestants, one name of many to be forgotten. There's nothing *special* about me. I truly believe that anyone who is willing to put in the work and make the proper sacrifices can go as far as they want in life; it won't be easy, but nothing worth doing ever is.

Four years ago, I could not have possibly imagined this outcome. I think one of my friends put it pretty well, something along the lines of "I still can't believe that I'm friends with some of the best math people in the world — who would ever have thought I'd be having conversations about shampoo with an IMO team member?" At the end of the day, the people in this community are what make all the hours of work worth it. How far I climbed up the AMC ladder won't matter much to me in ten years, but the friends I've made on this incredible journey will. There's a decent chance that I'll still be pretty close with them that far into the future, but at the very least I know I'll soon be seeing everyone in Boston for college.

This community has been a great place for fostering personal growth and building everlasting friendships, and I could not be happier with where I am now. I wish the best of luck to everyone just starting or in the middle of your competition journeys, and I hope that you too can come out of this with more than merely the math you will learn on the way.