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Montgomery County Math Team elevates math to competitive sport

By Ariana Eunjung Cha, Published: August 2

It's after 8 p.m. on a school night, and all the players are gathered for their final practice before the big national competition. Sam Zbarsky, one of the team's stars, is warming up by stretching his arms overhead in a diamond shape. Charlie Pasternak and Alex Smith are huddled at a cafeteria table, strategizing. Captain Andrew Hu is working the room, pumping everyone up.

The team members are cocky, and they have a right to be. Of the 16.6 million students enrolled in American high schools this year, they are the top 0.01 percent. These are the Kobe Bryants and Peyton Mannings of math.

The Montgomery County Math Team is one of a growing number of elite teams that are elevating math to a competitive sport in the United States.

Parents of these mathletes follow stats and rankings as closely as others do for basketball. Coaches complain that parents beg or argue with them to let their kids onto the team even when they fall short on qualifying scores. Competition is fierce: Top-ranked players begin training as young as sixth grade, attend summer math camps, and pay $100 an hour for private coaching.

The exploding popularity of high school math teams coincides with the emergence of the digital economy, one that at its core is powered by mathematics. In contrast to the oil, shipping and retail magnates of generations past, many of today's wealthiest and most powerful executives built their empires on algorithms and probability in fields such as Internet software and hedge funds.

Bram Cohen, creator of BitTorrent — the successor to file-sharing service Napster that at one point grew to host a third of all Internet traffic — was a star on New York's Stuyvesant High School math team. Facebook's Mark Zuckerberg — who runs the social networking company with 900 million users — was part of the top-ranked Phillips Exeter Academy team in New Hampshire.

Sergey Brin, the Google co-founder estimated to be worth $18.7 billion, is arguably the most famous alumnus of the Montgomery County Math Team, which draws students from other parts of the state. As a student at Eleanor Roosevelt High School 22 years ago, he had a reputation for being a jokester. During one math competition, teammates recall, he hosed everyone with water guns. (Click here to read about other standout alumni.)

The current crop of seniors from the Montgomery team seem to be on similarly ambitious paths. They are heading to Yale, Massachusetts Institute of Technology, California Institute of Technology and other top schools. These are students not used to disappointing.

And so it's a shock the evening of the last practice in May when coach Eric Walstein stands and frowns. His eyes move across the 100 or so students in front of him, pausing deliberately to stare at each of his five teams — A through D, with 15 members each, ranked in descending order of performance, plus a middle school team. He calls out the scores for the latest round.

"A team, you got 35." Out of 50. This is bad. "You have to take this *seriously,"* his voice booms across the cafeteria.

"B team: 35, which is okay. C team: 35, that's pretty good. D team: 20, which is why you're the D team. The junior team got a 25, which should teach everyone a lesson."

Walstein orders the students to come pick up three-inch binders full of complex math questions and work on them before the competition. And during the four-hour-plus bus ride to the nationals at Penn State in a few weeks, no playing cards, no headphones, he says, ignoring the groans.

After 36 years coaching the team, Walstein, 67, plans to retire this fall. The upcoming competition will be his last, and he wants to win.

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High school math teams are a bright spot in what is otherwise a bleak outlook for the United States in mathematics.

Once the main engine of global economic growth, the country is losing its place because it has fallen behind in math and science. In the most recent survey of math literacy by the Organization for Economic Cooperation and Development, U.S. students ranked 32nd out of 74 countries in math, while competitors such as China and South Korea ranked in the top 5.

Harvard University researchers who analyzed the findings calculated that the country "could enjoy a remarkable increment in its annual GDP growth per capita by enhancing the math proficiency of U.S. students." "When translated into dollar terms," Paul E. Peterson of Harvard's Kennedy School of Government and his colleagues wrote, "these magnitudes become staggering."

Even more disturbing is a second study, by math professors from the University of Texas, University of Minnesota and University of Wisconsin, which concludes that the United States is failing to develop the math skills of not only the average student, but also those who could excel.

The study laments that the U.S. students could be held back because of a stigma attached to being good at math, and recommends encouraging mathematically gifted children to participate in math competitions or training camps.

The Washington area is a microcosm for where math advocates hope the future is headed. Although certain parts of the country may be known for their ability to churn out teen pop stars, politicians or quarterbacks, the Washington area is making a name for itself as a hotbed for young mathematicians. At this year's American Regions Mathematics League national competition — by far the largest in-person meet — no fewer than 16 teams are signed up to represent Washington area schools or counties. That's double or triple that of any other large metropolitan area.

"It's a circuit like those for basketball or music or dance," said Jane Andraka, a nurse anesthesiologist from Crownsville, whose son Jack, 15, is one of the youngest on Montgomery County's A team.

At Georgetown Day School, where one out of every 10 students is on the math team, coach Andrew Lipps

says the practices are so popular they "have become social events." And at Thomas Jefferson High School for Science and Technology, the magnet school in Fairfax County, doing well on the math team is so revered that you can even get a varsity letter. "It's really an honor," said rising sophomore Tara Abrishami, 14.

Since Walstein, a math teacher in the Montgomery Blair High School magnet program, began coaching the Montgomery County team in 1976, it has placed in the top five 70 percent of the time and won the national championship twice. Its performance in 2011 was respectable but not spectacular; it ranked seventh out of 128 teams.

The challenge in recent years has come from powerful teams that happen to be the best funded in the league. New York City's is sponsored by global investment firm D.E. Shaw and Lehigh Valley's (with a budget of about $14,000) by a local entrepreneur, a matching grant from Google and Lehigh University, while Phillips Exeter's has a generous stipend from the private school and is able to recruit from all around the world. It is also coached by the professor who oversees the U.S. team going to the International Mathematical Olympiad.

The Montgomery team's funding, in contrast, is $0. Its $15,000 allocation was eliminated from the county's budget three years ago amid cuts in extracurricular programming. Even the coach is an unpaid volunteer.

The debate over math team funding is part of a larger one nationwide as school districts facing shrinking budgets shift money once allocated to gifted programs to those for lower-income students struggling to meet minimum academic standards.

It's unclear whether the Montgomery math team will survive after Walstein leaves. A group of rising seniors plans to coach, and one mother has tentatively volunteered, but everyone knows it won't be the same without Walstein. Known in Montgomery County for his vocal opposition to a math curriculum that he says values memorization over thinking, he is one of the best math team coaches in the country and was part of a group of mathematicians that founded the American Regions Mathematics League in 1976, way before math was cool.

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Everyone on the Montgomery math team is gifted. The average person can barely understand the questions, much less answer them. But even in a group like this, a handful such as Sam Zbarsky — a shy, intense 16-year-old who is a rising senior at Montgomery Blair and one of 12 winners of the U.S. Mathematical Olympiad this year — stand out. While other students work frantically to finish during the 10 minutes they are allotted per pair of questions, Zbarsky, more often than not, finishes early, leans back and reads a book.

Teammates say they envy his natural ability, but Sam's parents and those of other teammates say training is just as important. Alexander and Margaret Zbarsky, computer scientists from Russia who live in Rockville, said math was play for Sam starting when he was 2.

Margaret said that when she would cut up apples, she would ask questions such as how many quarters make a half. By the time he was 3, he could multiply and divide positive and negative numbers, and manipulate even numbers. They didn't think this was particularly remarkable, as Sam's three older brothers had caught on to the same concepts at the same speed.

Where Sam differed was in his passion. "The more difficult the problem, the more excited Sam got," his mother said. At 10, he was tracked into Takoma Park Middle School's magnet program and was competing nationally.

Sam's parents say they are often asked what they did to help Sam. They think their no-TV rule helped so their children had time to read books and think (they did occasionally allow educational movies), and they emphasized having diverse interests to stretch his brain (Sam is a fencer and is part of a Russian drama group). But they don't think they did anything special except to emphasize learning to better understand relations and patterns between various objects, concepts and people in the world.

"The main thing is that we push him hard to learn, but don't push him on grades," Alexander said.

Sam says he has trouble explaining the appeal of mathematics to him. Sometimes solutions are just obvious to him, and the numbers — "they are just beautiful."

Alexander Zbarsky says there's a disconnect between what Sam understands in his head and what he can express in words. "Just like gifted composers continuously build and hear melodies in their heads, the gifted mathematicians — hear? see? feel? — mathematical constructs in their heads," he said.

Sam's best friend, Charlie Pasternak, is also the youngest in a family of boys. His mother, Marli Pasternak, a Senate staffer, remembers that Charlie saw the opportunity to do math problems as a reward, and she and her husband encouraged that positive view. "We'd say, sweetie, if you get homework done, you and Daddy can talk about math," Marli remembered.

As a result, though his two big brothers and classmates teased him about math, Charlie laughed it off. It was Charlie, not his mother or father, who is an international tax lawyer, who decided he would enroll in the Takoma Park math and science magnet program and endure the hour-long bus ride from their home in Bethesda.

When you ask Charlie, a rising senior at Blair, what his goal in life is, he responds, "To solve cool problems."

Marli said she stopped understanding the problems Charlie was solving about the time he hit the fourth grade. "What I say about the people who are good at math is that they see math the way artists see the world. It's just different," she said.

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The American Regions Mathematics League competition is the largest math meet in the country. Held simultaneously in June in four locations, it draws together 2,400 students who are competing for $15,000 in scholarship money and thousands more in software and books.

At the Penn State site in State College, Pa., the largest meet, the grounds the morning of the big competition on June 2 are filled with bright T-shirts with such clever sayings as: "The essence of mathematics is freedom" (Fairfax County) and "Aggregate knowledge" (Lehigh Valley).

Sam, however, has decided not to wear the team T-shirt, an upbeat navy and white creation by one of the girls on the team that features the team's name in a fun, youthful script. Instead, Sam is in a frayed gray shirt that mirrors his mood. He's reeling from not making the U.S. team that's going to the International Mathematical Olympiad in Mar del Plata, Argentina. He only learned about it the previous night. The selection team said Sam was "very close" to making it.

It doesn't help that Walstein decides to confront him about it right after breakfast. "How come you didn't tell me?" Walstein asks within earshot of other A team members.

Sam looks at his feet and starts mumbling something, but he's saved by the fact that the competition is about

to begin and it is time for Walstein's pep talk.

"All of you need to get serious," he says, using That Word again. "No giggling, no side conversations. You have a perfectly reasonable chance of winning today. You've got the brain power. That's not the problem. But to win, you have to work as a team."

The members of the A team settle into their chairs in Life Sciences 008, and for the first time ever, they're nervous. Their proctor, a longtime coach for the New York City team, seems to delight in teasing the team. He gives the students the standard warning about handing in their cellphones and calculators and says he will not tolerate cheating. But he can't resist getting in a jab, saying it wouldn't matter anyway: "You're not going to come close to New York City," he says, only half-joking.

The A team's 13 boys and two girls whip out their sharpened No. 2 pencils and get to work. The team rounds, which consist of 20 questions that must be answered as a group and a "power question" that is essentially a long proof, are critical, worth 100 out of a possible 300 points.

The 2012 power question, which the team has one hour to complete, is a doozy. It is three pages long and involves one robber and one or more cops. The basic idea is that a robber has held up a bank and retreated to a network of hideouts represented by a diagram. During the day, the robber remains in a hideout but moves to an adjacent one every night. The question is to determine whether, given a hideout map and a fixed number of cops, the cops can be sure of catching the robber within some time limit.

One boy is shaking his head: "This is hard, so horribly hard." Other team members divide into groups of two or three and start brainstorming: "You're dealing with time and location. …" "If you find the island he's on, restrict him to that island. …" "For each segment, you need two weekdays. …"

With 20 minutes left, the easier parts of the proof have been answered, and almost everyone has given up on the rest. Except Sam. He's pacing, clicking his pen over and over, in between scribbling answers. Andrew may be team captain, but it's clear Sam's in charge.

His thoughts are interrupted when he notices Charlie explaining the answer to an earlier part of the proof to a teammate. "Go work on another problem, Charlie, instead of talking about one you already did, okay?" he snaps, before returning to his pacing.

Charlie ignores him. Five minutes pass, and Sam interrupts again: "Charlie, is this important?"

Teammates look up from their desks and brace for a blowup fight, but after more than six years being friends and teammates, Charlie is used to this kind of argument during the heat of competition, so he just tells Sam, "That's not helpful" and returns to his conversation.

Sam eventually gets the answer on his own and furiously scrawls it down before the proctor calls the time.

A few minutes later, all's well again as the two laugh and smile as they walk across campus to the auditorium for the second half of the competition.

The final rounds, held in the Bryce Jordan Center, are a sight to behold. More than 1,600 mathletes are crowded into the stands, seated in neat rows with portable desks on their laps working out math problems.

No one's supposed to know results until the very end, but coaches gossip and the standings leak. For 10 minutes, there's excitement: With the power round still being scored, Montgomery is in third place after Phillips Exeter and Lehigh Valley but ahead of New York City!

The euphoria evaporates quickly as results start to roll in from other sites. Teams from North Carolina, San Francisco and San Diego who are taking the exams at the Southern and Western sites — which in the past have not done as well as those at Penn State — did extraordinarily well. And New York rocked the power round, pushing ahead of Montgomery by a few points. In the end, Montgomery County took fourth place at the Penn State site behind Lehigh Valley, Phillips Exeter and New York City, but placed ninth out of 160 teams nationwide.

The individual results are a shocker, too. Only one boy from the Montgomery team — Alex Smith, a rising senior from La Plata who drives an hour each way to train with the team — manages to rank high enough, 13th, to win a $650 cash prize. Sam was tied with dozens of others for 59th place. Charlie doesn't score high enough this time to make the high scorers' list.

On the ride back home, the A team takes over the back of one of the buses and is going over what went wrong. Charlie says the team rounds were harder than they anticipated, but he is happy to have done well on the relay portion of the competition, historically the team's weakest event.

Sam focuses on himself. "I hoped I would do better," he says.

Walstein is philosophical. "They didn't perform to their potential," he says. "They did well, compared to the rest of the country but not compared to how they should have done."

It was a disappointing swan song for such a long career, but he reminds himself that this year's Montgomery A team is a young one — only two seniors — so most players would have another shot next year.

In a strange twist of fate, Walstein would learn a few weeks later that he would, too. Paperwork delayed his retirement another year. His boss called and asked him to continue coaching.

Ariana Eunjung Cha is a Washington Post staff writer. To comment on this story, send e-mail to wpmagazine@washpost.com.