Mathcamp is a project of the Mathematics Foundation of America, EIN 57-1035414.

Looking back: Mathcamp 2021 at VMC

"As a virtual camp, Mathcamp gave me an experience that blew all in person camps out of the water."

– Nathan Cho (Silver Spring, MD)

Mathcamp 2021 was held July 3–August 8 online at our Virtual Mathcampus.

From Painted Post, NY to Saskatoon, Saskatchewan; from Baku, Azerbeijan, to Medan, Indonesia, this year's campers came together during the Covid-19 pandemic for a virtual summer of Mathcamp, joining us online from 26 U.S. states, 3 Canadian provinces, and 7other countries. There were 44 girls, 5 non-binary students, and 63 boys; 37 alums, and 75 fantastic new campers, selected through a competitive application process (from 540 applicants!) based on their excellent essays, recommendations, and Qualifying Quiz solutions.

"The only bad thing about Mathcamp is that it ends."

– Erik Brodsky (Cortlandt Manor, NY)

Challenge yourself with a Quiz problem!

A construction company is designing a new apartment complex. They have an $n \times n$ lot in which each 1×1 square can either occupy an apartment or a garden.

The apartments must all have a scenic view: if an apartment is not on the edge of the apartment complex, then one of the 4 adjacent lots must have a garden.

(a) What is the minimal number of gardens if $n = 6$?

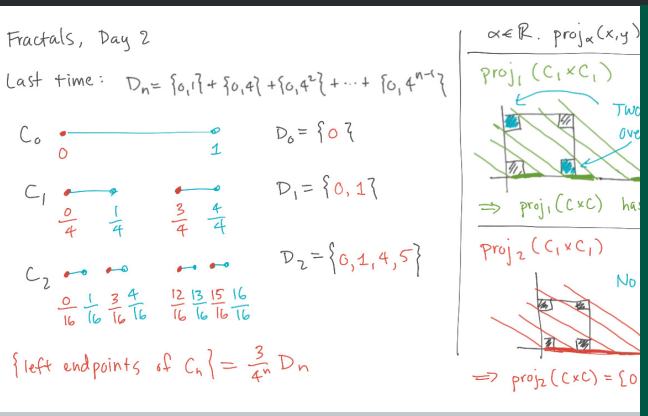
(b) Prove that the number of gardens must be at least $(1/5)(n-2)^2$.

(c) Prove that it is possible to construct an apartment complex with no more than $(1/5)n^2$ gardens for any n.

(d) Now suppose that gardens have very tall trees that provide a scenic view to up to 20 nearby lots. Specifically, if a garden is placed at the center of a 5×5 square, then every apartment in that square except the four 1×1 corners will have a scenic view of the garden.

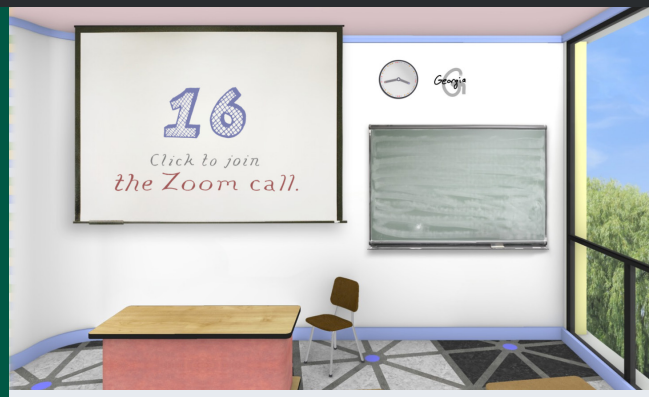
What upper and lower bounds can you prove on the number of gardens needed?

Math at Mathcamp 2021



Classes

Mathcampers begin each summer by talking with their academic advisor, whose role is to help address the question: ***What kind of academic experience do you want to create this summer?*** The possibilities aren't endless, but they're vast: from "Finite fields: the power of Frobenius" to "Better sleep through modelling", students had over 100 classes to choose from. Here is just one example, from mentor Aaron Anderson:



Model Theory

At Mathcamp, we encounter loads of different mathematical widgets. There are groups, graphs, posets, tosets, rings, fields, vector spaces, and more. That's a lot to keep track of, but with model theory, we can view all of these as examples of the same phenomenon. We'll tie all these together with a nice logical framework. We'll give general definitions of "mathematical structures," "axiom systems," and "proofs".

Then we'll use those definitions to construct some Alice-in-Wonderlandishly weird examples. A theorem that makes structures big, a theorem that makes structures small, infinite natural numbers, infinitesimal reals, and tiny universes of set theory that can fit in your (countably infinite) pocket.

Projects

The Project Fair is when our work outside classroom hours comes together. Some students presented posters on mathematical topics like incidence combinatorics elliptic curves, or pseudopolynomials. Others worked on hands-on projects like "Teaching math to computers" or "Fibbonaci music". After hours and hours of preparation, several students even taught their own classes!

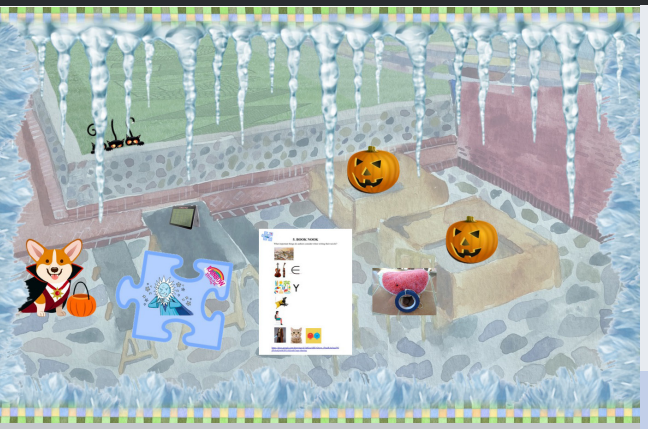
"In the 5 weeks at VMC, I have grown more as a mathematician than I have in any other summers in my life."

– Skyla Ma (Los Angeles, CA)

"There had been many things in math that felt like unexplainable magic to me before Mathcamp. After Mathcamp they still seem like magic, but of a different kind of magic – the one you understand and can use to your advantage."

– Michał Lipiec (Łódź, Poland)

Outside the Classroom at Mathcamp 2021



Social Activities

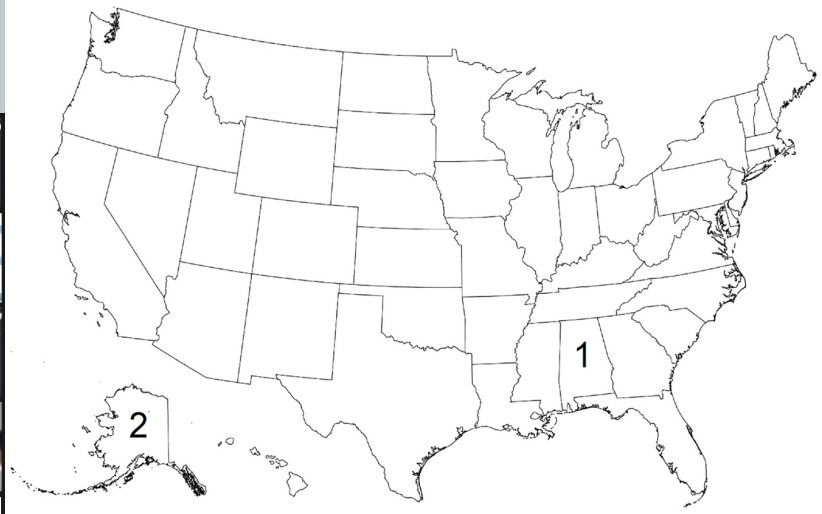
As always, staff and students organized tons of events. We swapped life skills on Slack, and swapped songs around the virtual campfire; solved crossword puzzles; listened to bedtime stories; planked between classes, and collectively ran the length of California; made pretzel knots and hummus; launched a friendship pyramid scheme... and made real friends along the way.

"After three summers of Mathcamp, I can truly say Mathcamp is not my second home but my first home."

– Quinn Perian (Boulder, CO)

Annual Puzzle Hunt

Each year, the staff design a day-long Puzzle Hunt, heralded as one of our best field trips. This year's Hunt was themed around the lack of balance between four Avatars: Air, Water, Earth and Fire. For a challenge, try to solve the puzzle below: "States Rock".



_ _ Living rock, coloured tar, polyps grow quite bizzare.
\+ _ _ Like a Pokemon, open me. Find crystals, guarantee.
\+ _ _ My color may be brown or pink. This Boulder may contain zinc.
\- _ _ Rotate square that rains on planets, Queen's 60th, better plan it!
= _ _

"Mathcamp is seriously the most genuine and welcoming community that I've ever been a part of. The people here are really incredible and I will miss it so, so much."

– Alicia Zhang (Fort Lee, NJ)

Supporting Mathcamp

Mathcamp 2022 will take place this summer at Colby College, Waterville, Maine, from July 3 to August 7. We look forward to returning to a residential format and welcoming new campers and alumni from all over the world, all sharing a love of math!

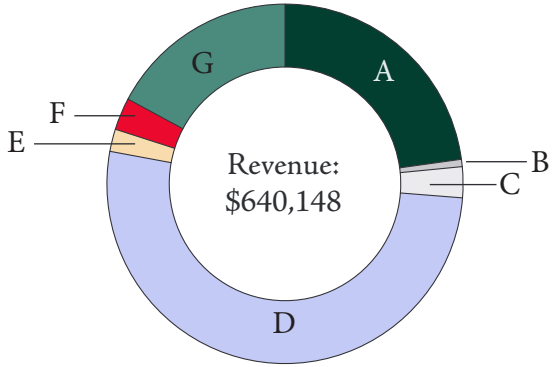
FY 2020–21 Revenue

A Tuition (after financial aid)	$ 146,050
B AMS Grant	$ 4,200
C Scholarship Fund Gifts	$ 17,750
D Unrestricted Individual Gifts	$ 330,666
D Corporate Donations	$ 17,873
F In-Kind Donations	$ 18,590
G Misc income (includes PPP)	$ 110,003

Mathcamp gives a formative intellectual and social experience to incredible kids, and one of our guiding principles is that camp should be accessible to every qualified student – whether or not they can afford the tuition. Admission is irrespective of financial aid, and we fully meet the need of every Mathcamper.

FY 2020–21 Expenses

A Mathcamp 2021	$ 367,417
• Staff Salaries - 69%	
• Virtual Campus - 1%	
• Other Camp Expenses - 30%	
B Alumni Programming	$ 1,882
C Administrative	$ 81,920
D Fundraising	$ 18,083



Donations keep Mathcamp open to all.

Mathcamp is *free* for U.S. and Canadian families with household incomes of $65,000 and below, and we even offer *travel grants* (if residential) and *technology grants* (if online). Need-based financial aid is also available for middle-income families and international students. A small portion of our aid budget comes from the National Science Foundation and the American Mathematical Society, and the rest comes from the program's supportive alumni, families, and friends.

Give today: www.mathcamp.org/donate