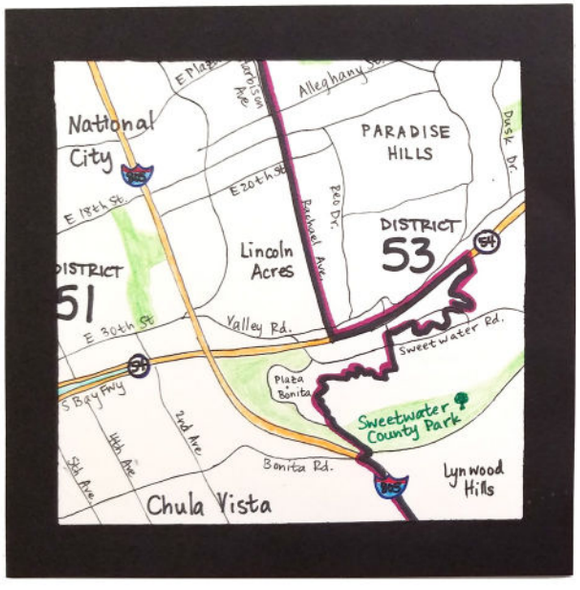

How Does My Vote Matter?
Mele Sato, Math
12th Grade
High Tech High Media Arts

In their senior year, many students first become eligible to vote. Some are excited while some are not. We launched our project with a mock election in which students vote using systems such as one-person-one vote, an electoral college, instant runoff, and a two-party election. We showed that with the same votes, different systems generate different outcomes. Students exclaimed: "Wait, what? That's not fair!"

Given most teenagers' strong sense of justice, this motivated students to examine voting systems using the mathematical methods of measuring "fairness." Throughout the project, students ask, "If current voting systems are unfair, what would a fairer system look like?" Students analyzed local districts for compactness and proportional representation using census data and historical boundaries. They proposed new, fairer district boundaries and tested their proposals using mathematical tools like the Polsby Popper and Reock measures.

Students created mathematical posters that show fairer voting systems for different elections and demonstrate how these systems, gerrymandering, and other techniques impact the results. They created data visualizations that answer the questions: "Why is this important in my life? How has this change impacted me?" Students host a voter information night in which they teach the public about voting systems and the guests vote to determine the system that they think is most fair.

Teacher Reflection
The most memorable moments are when students' curiosity is piqued, because of an article we read, a podcast we listened to, or from calculating compactness, proportionality, and efficiency gap measures. Current events increase the relevancy and urgency of the mathematics that we're learning and make the classroom a dynamic environment.

—Mele Sato

Student Reflection
The voting project was really engaging because of the intersections between history, political science, and math, which I had only looked at through separate lenses in the past. This project gave me the tools to back up my own opinions with math and data. I also enjoyed learning about the different mathematical ways to measure fairness because I didn't previously know that fairness was something that could be measured. Talking about fairness also led to a lot of philosophical conversations about mathematics.

—Olivia E.