

Making Sense of Real-World Data in Math

LESSON/PROJECT

Mathematical Modeling for Climate Data

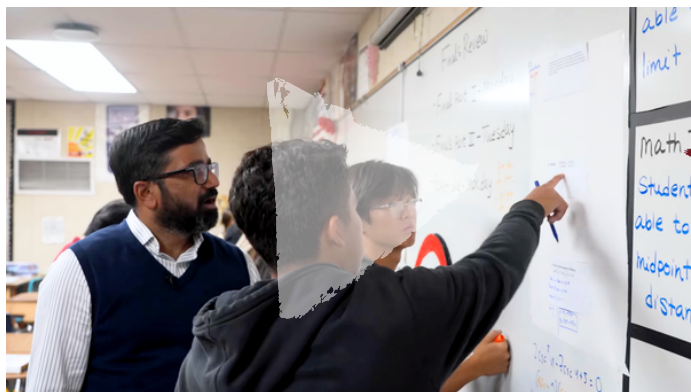
SUBJECT

Algebra

GRADE(S)

11

watch the video



In an 11th grade advanced algebra (precalculus) class, students complete a multi-week project focused on the application of functions for mathematical modeling with real-life data to address the debate about impacts of climate change.

The students start by watching clips with differing views on the facts of issues at the heart of climate change, including reviewing substantiated claims from data trends. They write an initial reflection entry making meaning of what they are seeing, hearing, thinking and feeling. They then pursue various mathematical calculations using available datasets (e.g., global and local carbon dioxide emission and temperature trends) to build their own models. **The students reflect in another journal entry on**

Compelling questions, multiple perspectives

how the math content they are learning is informing their view on the issue of climate change before

Constructive reflection

presenting their case to their teacher with evidence from their models. In parallel, they are also supported in engaging in a related community volunteer activity that affords them the chance to talk about these issues and what they are learning with people outside the school context. From these experiences, the students summarize their insights in **a letter to a local elected official** that is rooted in their math analysis as well as their volunteering and that offers some recommendations around approaching the climate change issue from a local perspective.

Meaningful voice

(continued on the next page)

SEE IT IN ACTION: EXAMPLES FROM EDUCATORS

The project concludes with students writing a culminating reflection piece about what mattered to them about

this project, how they think about the power of mathematical modeling, and what it felt like to engage in civic action.

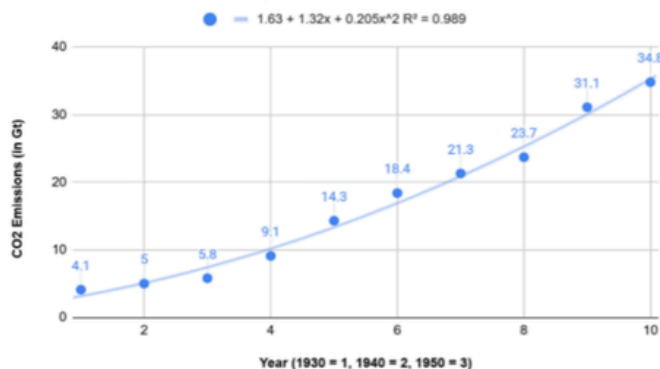
Student Work

Mathematical evidence from a student's final report:

The CO₂ emissions scatterplot from 1940 to 2020 follows a quadratic model, represented by the equation: $y = 0.205x^2 + 1.32x + 1.63$.

A quadratic model is appropriate because CO₂ emissions are not increasing at a constant rate; instead, the rate of increase itself is accelerating. This reflects rapid industrialization, population growth, and increased energy consumption over time.

World CO₂ Emissions by Decade



Quadratic Scatter Plot Used

2040 $Y = 0.205x^2 + 1.32x + 1.63$
 $Y = 0.205 (12)^2 + 1.32 (12) + 1.63$
 $Y = 29.52 + 15.84 + 1.63$
 $Y = 46.99$ Gt

2060 $Y = 0.205 (14)^2 + 1.32 (14) + 1.63$
 $Y = 40.18 + 18.48 + 1.63$
 $Y = 60.29$ Gt

Conclusion from a student's final report, titled "Tipping Point"

After completing this project, my perspective on climate change has changed significantly. What once felt like a distant and abstract issue is now something I understand through real data, mathematical models, and firsthand experience. Seeing how population growth, CO₂ emissions, and temperature increases are mathematically connected helped me recognize the role humans play in shaping the planet's future. The service experience reinforced that individual actions, when combined, can make a real difference. This project encouraged me to think more critically about my own responsibilities and how informed choices can contribute to addressing climate change.