



# Socratic Mathematics

with Bill Carey

## Introduction to Socratic Mathematics

### Outline:

#### Introduction to Socratic Mathematics

- Watch videos after you have talked as a group.
- The primary activity of mathematicians is reading to one another and writing to one another and trying to make sense of their ideas. It is a surprisingly human endeavor.
- There is joy in taking up the pen and trying to think like a mathematician.
- The goal is not practical usefulness. This is a lot more like reading poetry.
  - There are true ideas wrapped in beautiful patterns.
- Greek arithmetic is a great place to start because the waters are calm and deep.
  - Greek arithmetic shapes a lot of how we think about mathematics in the modern world.
- How do you read and think about mathematics?
  - You have to read actively. Be attentive to the text. Read slowly. Often reread mathematics.
  - Read to notice things. Look for similarities and differences.
  - Find patterns.
  - Move from the particular to the general.
- Talking in a group about mathematics:
  - You do not need to say something new, true, and clever.
  - First principle of mathematical discussions: Humility
    - Mathematics is hard.
    - You might conclude wrong things.
    - You might say wrong things, even in public.
  - Second principle of mathematical discussions: Charity
    - If you expect people to say wrong things, you can't be mean to them when they say wrong things.
    - Say, "I think there might be a counterexample to the pattern you just articulated," as a way to correct discussion.
    - You want vulnerable risk taking for productive risk taking.
  - If you are the most clever mathematician in the room, your job is to be quiet and help them see something without stealing their joy.
  - If you are not the most clever mathematician:
    - You can say, "I don't really understand this".
    - You can slow the group down. This helps the group move towards truth.



- You can offer a general conjecture.
- You can work a particular conjecture. You can share whether or not a conjecture works.
- Call out something as important.
- Challenge someone's idea.
- Cultural expectations you bring to a mathematical discussion:
  - Your mathematical discussion should be just the opposite of all these.
  - Math is busy.
    - Think of it more as restful and playful.
  - Mathematics is Sisyphean.
    - These discussions are meant for play and enjoyment. If you get stuck, let it rest.
  - Math is authoritarian.
    - The first thing you want to do is convince yourself of your ideas.
    - Next, you want to convince your friends that your conjecture is true.
    - This is building towards truth together.