

THE PIANO PROBLEM

The professor steps to the front of the class. He doesn't look particularly distinguished; he's balding, and has the kind of suit worn by every other professor I've seen. But I've heard rumors about him. They say he worked on the Manhattan Project, developing the nuclear bomb. They say he was asked to give lectures when he was a student in Italy. They say he's one of the best professors at the University of Chicago.

Myself, I'm a bit skeptical. My goal is to get through the course as quickly as possible to get my degree. I don't see how any teacher could make math interesting.

The professor introduces himself as Enrico Fermi. "In statistics and in physics," he tells us, "accurate answers are very important. We can't always trust the numbers alone to give us accurate results; we must make sure the procedures are accurate, too. And that often requires preliminary estimation."

I slump in my seat. Now come the formulas. My notebook is already full of formulas from previous classes, which I was supposed to memorize but never ended up doing.

"So as a warm-up problem," Fermi continues, "how many piano tuners are in Chicago?"

He writes it on the board. "I'll give you twenty minutes. You can work in groups."

I blink. This isn't math. Where are the symbols and formulas? How is this even solvable?

A couple other students sit down beside me. One has glasses, the other has frizzy red hair. They look just as confused as I am.

"Are we supposed to go to the library for this?" I ask. "Like, do research?"

The red-haired one shakes his head. "I don't think so. This is stupid. How are we supposed to do this?"

The one with glasses opens his notebook. It's covered in mathematical doodles, and has "Steven" written on the inside cover. "Maybe we're supposed to guess," he says.

"You mean, guess randomly?" I ask.

"No, not randomly. Methodically. Using what we already know."

The red-head rolls his eyes. "I suppose you've already got a formula in there for calculating Piano Tuner Density?"

Steven ignores him. "About how many people are in Chicago?"

"I don't know," I say. "It's a big city. Maybe nine million?"

"Okay." He writes something down. "And how many people in each household?"

"On average? Probably two."

"So if we divide nine million by two, we get about 4.5 million households."

The red-head nods. "I see. Now we figure out how many of those houses would have a piano?"

"Yeah. Pianos aren't too common. Why don't we say one in twenty?"

He does the math in the notebook. We now have 225,000 pianos in Chicago. We stare at the paper, not sure where to go from here.

Steven taps the notebook. “Why don’t we figure out how many piano tunings happen each year, and figure out how many piano tuners you’d need to do all of them?”

We decide that each piano gets tuned once a year; that tuning a piano takes about two hours; and that each piano tuner works eight hours a day, five days a week, fifty weeks a year. This means that there are 225,000 piano tunings a year, and each piano tuner can tune 1000 pianos in a year. So there would need to be 225 piano tuners to get all the tunings done.

Fermi calls time, and the groups give their results. Some groups had guessed randomly. One group comes in late, because they’d run to the library to frantically research piano tuners. A couple groups have results similar to ours. Fermi reveals the real answer: around 290. I feel a rush of pride. Our answer is one of the closest.

“Thanks for helping,” I tell Steve.

He shrugs. “My older brother took this class. I knew what to expect.”

Fermi starts in on the lecture. I open my notebook. Maybe math can be interesting, after all.