**“When will we ever use this in real life?”**

Is something that my friend jokingly asked our analysis professor on the first day of university when we were shown the epsilon-delta definition of a limit. It’s a question that has been asked by generations of unwilling high school maths students, yet it remains difficult to answer in a satisfying way.

Part of the issue is that this is a short-sighted question. Maybe the student sees maths a bit like chore and, maturely understanding that the other chores in their life provide them immediate value, ask the same of their studies. However, they will probably be disappointed to learn that most maths concepts will only help much later, to understand other, more advanced concepts. I have heard people describe maths as a ‘pyramid scheme’ for this reason—you learn it for the sole purpose of learning more of it, and then when you are at the top of your game, you teach it to others.

The second thing that makes this question hard to answer is that while it is hard to learn maths, it is harder still to perceive the real world mathematically. Part of this is perhaps a product of the way it is taught; in school, you only ever see problems where all of the required information is given to you, and the task is a destructive one: take a puzzle and rip it to pieces until not a shred of mystery remains. While can be fun depending on the puzzle, it is quite opposite to thinking mathematically about the real world, where the challenge of converting a real-world decision point into numbers is perhaps harder, or at least is a rarer skill, than the maths you would be performing on those numbers.

Some teachers and programs attempt to develop this skill and quell the student’s question by making extensive use of word problems. While this may help someone learning their times tables to understand what it is they are actually accomplishing when they multiply two numbers, as the problems get more advanced the scenario becomes significantly less compelling. For example, I have seen at least twenty variants of the “cars and motorbikes” problem, which is a very unrealistic scenario: a parking lot has cars and motorbikes, and there are 40 vehicles and 120 wheels on those vehicles how many cars are there?

When a student asks, “when will we ever use this?”, I believe what they are asking for is a reason to care. And this is tough for high school maths! Because some of it can be pretty mundane and technical compared to the thrilling world of maths that’s really out there. So when I have been asked this question, I try to show one of the cool applications of maths that is on the student’s horizon while avoiding the technical details as much as possible, prioritising conveying what the maths achieves rather than how it gets there, the hope being that the unanswered questions the student now has about how it all works becomes the justification they were looking for.