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Advice to a Young Mathematician

By Adrian Dudek | September 26, 2013

Sir Michael Atiyah during his talk at #hlf13. Picture: HLFF @Bernhard Kreutzer

I thought it would be a good idea to relay some of the advice given by Sir Michael Francis Atiyah during his talk on Tuesday.

Always ask yourself questions. Atiyah says that one of the secrets of his success is to always be curious.

- *Don't get disheartened in your early years*. Most mathematicians have a slow start. It's important to keep on pushing and eventually a breakthrough will come. Indeed, Michael mentioned that when he was young he had a slow year, and so he sought advice from a great mathematician of the day. It turns out that this great mathematician had also had a disheartening year when he had started!
- *Collaboration is important*. There are benefits, mathematical and personal, when one collaborates in research with another. On the technical level, you get a second opinion and a fresh set of ideas to add to your own. On the personal level, you can make good friends while you work.
- *Manage how much you get sidetracked*. When you're working on a big problem, you can often get sidetracked on a smaller problem. It's important to realise that 9 out of 10 such sidetracks will lead nowhere, so it's a good practice to know when to abandon your deviations. Of course, this management is tricky, as 1 out of 10 times you might just be on to something!
- *Attending a bad lecture can be useful*. There are many times when you go to a talk where the presenter will state a beautiful theorem. However, they make a complete mess of things when they go to the proof. If it looks like the talk is heading in this direction, have a go at understanding intuitively the ideas behind the proof. That is, try and nut out the proof yourself on a piece of paper, rather than continue to watch the presenter struggle.
- *Keep a collection of grounding examples in your area*. If you are working your way through a very theoretical area, it's important to have at least one example of every theorem you come across. This helps to keep things both intuitive and connected, and makes for an easy catch-up if you ever have a few weeks away from work.
- *The most important thing for your PhD is to have a good supervisor*. In particular, try to get supervision by a world expert. Second rate mathematicians won't be able to give you clear answers to high calibre questions. By having a sharp supervisor, you get a front row seat to the thinking that happens on the top floor of maths.
- *Make the introduction to your papers readable to any mathematician*. As it stands, about 99% of papers in mathematics are unreadable to the non-specialist. You should aim to make the introduction accessible to all mathematicians.
- *A badly written paper is ignored*. Writing a good paper is important. You should never rush it. A good practice is to start by first laying out the logical structure of the paper, before having a go at writing. Once you're done, put the paper to the side for a few weeks before giving it a look over with a fresh set of eyes. Don't be afraid to rewrite the entire paper, especially if it would improve it.
- *Use rough ideas in your papers*. Before you launch into your formal proof, give the reader a rough outline as to what is about to

happen. You'd do this in a talk, right?

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This blog post originates from the official blog of the 1st Heidelberg Laureate Forum (HLF) which takes place September 22 – 27, 2013 in Heidelberg, Germany. 40 Abel, Fields, and Turing Laureates will gather to meet a select group of 200 young researchers. Adrian Dudek is a member of the HLF blog team. Please find all his postings on the HLF blog.

About the Author: Adrian Dudek is an official attendee as a 'young researcher' and vivacious admirer of mathematics, Adrian once feasted on a maths degree at the University of Western Australia. Whilst waiting for his food to settle, he took up a full-time teaching position at UWA, where he catered to the hunger of budding scientists. An obsession with prime numbers ultimately led Adrian to his dessert; a PhD in analytic number theory at the Australian National University. When he's not banging his head against his desk, he finds enjoyment in football (spherical, not ellipsoidal), cycling, chess and poker. Within the fray, Adrian finds time to document his adventures in his blog, and looks forward to giving the outside world a sneak peek into the excitement of the first ever Heidelberg Laureate Forum. Follow on Twitter @AdrianDudek.

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