Letter from a mathematician

Plus reader Hassan Azad is a Professor of Mathematics at the King Fahd University in Dhahran, Saudi Arabia. He has asked us to reprint a letter he wrote his students, explaining the joys of being a mathematician. We think the points he makes have wide relevance.

Dear Students,

Most of you have joined this university with clear ideas about a profession in engineering or business. I have been teaching mathematics here since 1996 and have experienced that in a class of forty, there is at least one student who has obvious mathematical talents. For such students, adopting mathematics as a profession would be more rewarding than a career in engineering or business. After talking with such students, I found that the reasons why such mathematically talented students do not opt for mathematics are based basically on two gross misconceptions about mathematics. Namely, that

- there is nothing new to be discovered in mathematics
- the only job opportunities that mathematics provides are in teaching.

Nothing could be further from the truth. While teaching is an essential profession and very rewarding for a large majority, there are many other avenues open to mathematicians.

I can very well see why you think mathematics is a dead subject. Every year, Nobel prizes are given in chemistry, physics and so on for progress in these fields and the Nobel laureates are very much visible to you through newspapers and television. The absence of a Nobel prize for mathematics no doubt reinforces in your minds the impression that, perhaps, mathematics is after all a second rate subject. Why there is no Nobel prize in mathematics is a very good question and you will find detailed discussions and answers on the Internet. It seems that Alfred Nobel had more or less the same ideas about the importance of mathematics as you do, just as Thomas Alva Edison had a low opinion about theoretical aspects of basic sciences. The good news for mathematics is that in the very near future a yearly prize - the Abel Prize - named after the famed Norwegian mathematician Niels Henrik Abel, will be given for discoveries in Mathematics and it will be as prestigious, rewarding and visible as the Nobel prize. Thus a gross injustice to the visibility of mathematics in the public domain will soon be undone.

"you see them working in their laboratories"

While you may have a clear idea of what a physicist or a chemist does - because you see them working in their laboratories - you may not have a very clear picture of what a professional mathematician does to discover something new. Well, the laboratory of a mathematician is the laboratory of ideas which are handed down through generations of mathematicians. The usual task of a mathematician is to combine these ideas to form new ideas, to link hitherto unrelated mathematical ideas and, of course, to have original ideas. All of this demands extreme hard work and patience but if you are mathematically talented, you will certainly have a couple of good original ideas and these ideas would be enough to earn you a respectable place in the comity of mathematicians.

Just as most of you learn to appreciate language and can recognise beautiful phrases and ideas, a trained mathematician also learns to recognise beauty in mathematics and to sift good ideas and he is guided in his researches by such largely aesthetic criteria. The joy of discovering a truly fruitful idea is something that can only be experienced; it cannot be described in words.

Mathematicians, by training and inclination, are always toying with ideas and are great problem solvers. They are also trained to absorb, condense and present logically vast amounts of information. For this reason, it is no surprise that they are in great demand in a surprisingly wide range of jobs - in development, designing and research wings of aircraft and automobile industries, as software developers for major computer companies, in financial institutions, in insurance companies and even in law firms - apart from their traditional employment in research institutes devoted to mathematics and physics. The Microsoft Corporation is so impressed with mathematicians and their way of thinking that it has established its very own research institute for mathematics.

As regards the relevance to everyday life of what you will study in advanced mathematics, the truth is that mathematics is ahead of applications by about a hundred years - sometimes much more - as in the case of study of conic sections by Greeks and their applications to the motion of planets and satellites almost two thousand years later. However, this gap seems to be rapidly decreasing now - as in the case of fractals and wavelets.

I hope that these lines have helped to correct your impressions about mathematics and that they will help you in making informed decisions about your careers.

If you have anything to say about this or any other topic that might be of interest to *Plus* readers, e-mail plus@maths.cam.ac.uk. Let us know if you are happy for your email and our response to be published in *Plus*. (We may edit emails before publication.)