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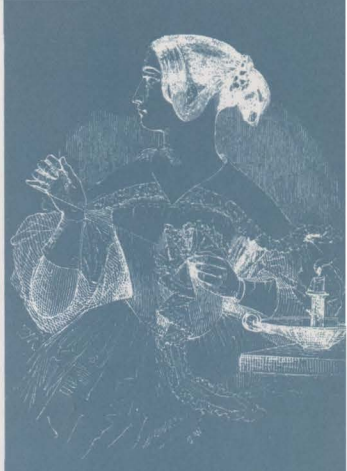
A Great Woman Mathematician

Amalie Emmy Noether

(1882-1935)

by Ng Lo Mun



Amalie Emmy Noether was a German mathematician whose work was of great importance to the development of modern algebra. Born in the year 1882, Emmy had always been different from other girls of her generation. No doubt she attended the usual school for girls where she learned to play the piano, to manage a house and to act polite at dances, but her heart was never into it. Her passion was in the study of Mathematics. Perhaps it was her father's influence. He would always come home excited from his classes at the University of Erlangen where he taught Mathematics. He loved to gather Emmy and her three younger brothers around him and explain complicated ideas in a way that his children could understand. Emmy especially was fascinated with her father's ideas about algebra and could catch on very quickly.

An extremely bright girl Emmy may be, but Germany at that time was not ready for a young woman who wanted to study Mathematics. Women could not enrol for a course in Mathematics at the University of Erlangen. Fortunately for Emmy, she had very supportive parents who arranged for a tutor to teach her Mathematics. By 1902, when the university decided to admit women, Emmy was more than ready. She was the only woman in her class but she worked hard at producing her best work. In no time at all, Emmy managed to distinguish herself as a very creative scholar with the ability to see the larger concepts underlying mathematical processes. In 1907, Emmy obtained her doctoral degree in Mathematics with highest honours.

Getting her education might have been a struggle but Emmy's problems were far from over. While the universities were starting to enrol women as students, they were definitely not ready to employ them as professors to teach in universities. What was Emmy going to do to support herself? Fortunately, her family came to her help again. She lived at home while working in the university without any pay. This carried on for 8 years during which time Emmy would sometimes teach in place of her father who had grown increasingly weak from the polio which he contracted as a child.

After Emmy's father retired and her mother had passed away, she moved to the city of Göttingen. At the university there, David Hilbert and Felix Klein were working on Einstein's theory of relativity. Emmy was invited to join them in their research as they were very enthusiastic about what she could contribute. They even appealed to the university to hire her but to no avail. Gradually however, through hard work and brilliant results, she managed to win their respect and was finally given a modest salary. Emmy published many papers and was invited to speak in several countries. She was changing the way mathematicians understood algebra. Emmy had a unique ability to work with abstract concepts and visualize complex connections and help others see them too.

At Göttingen, Emmy led a quiet lifestyle. She was well-loved by her friends. Students enjoyed her company and her courses were never boring. Emmy expected her students to work hard and she taught them the importance of understanding the structures underlying the algebraic systems.

By 1933, Emmy had achieved many of her goals in life. She was respected as a professor and privileged to work with the top mathematicians in Europe. She was able to explore mathematical ideas to her heart's content. However everything changed when Adolf Hitler came to power. In 1933, Hilter placed Emmy and many of her colleagues "on leave until further notice" in an effort to maintain absolute control - even over ideas. Emmy remained calm and courageous despite the disadvantages that were against her, namely: she was an intellectual woman, she was Jewish and she was politically liberal. It was obvious that Emmy would have to leave her country.

Emmy was offered a "visiting professorship" position at Bryn Mawr College near Philadelphia in the United States. She enjoyed her days at Bryn Mawr even though she missed her home country. For the first time, Emmy received a decent salary. More importantly, she valued her relationship with her students. They would often accompany her on her Saturday afternoon jaunts where she would become totally absorbed in talking about Mathematics.

While Emmy was at Bryn Mawr, she also worked at the Institute for Advanced Studies at Princeton University. Albert Einstein and Herman Weyl were also there at the same time and the three of them attracted many common admirers. In Emmy's studies in algebra, she showed mathematicians how to formulate general theorems that would apply to many problems.

In 1935 Emmy Noether died unexpectedly from complications of a routine surgery. Her death was a terrible loss to the field of mathematical research as she was at the peak of her career then. Many came to pay their respects and to offer tributes to her contribution to mathematics. To quote Einstein: "In the judgement of the most competent living mathematicians, Fraulein Noether was the most significant creative mathematical genius thus far produced since the higher education of women began..."

Certainly, Emmy Noether's contribution to Mathematics cannot be challenged. But she had also made another contribution to human history. She showed that following one's dreams and standing up to society's opposition can lead to great achievement and satisfaction. M^2

Mdm Ng Lo Mun graduated with an Honours degree in Mathematics from NUS in 1984. She has been teaching mathematics until 1994. Mdm Ng has since left teaching to take care of her four children.