

Honoring the Queen of the Sciences

By: Yoel Tzafrir

Every year, following the announcement of the Nobel laureates in the sciences, the same question arises: Why isn't there a Nobel Prize in Mathematics? Myths and urban legends abound, but there isn't a clear answer why the Queen of the Sciences is excluded from the prestigious Stockholm ceremony. Yet mathematicians aren't entirely shunned; one of math's highest honorifics is the Abel Prize, considered to be the Nobel of Mathematics. To date, no Israeli has received this prize.

Every year, towards the end of October, the world – or rather, the scientific community – holds its breath, waiting for the winners of the Nobel Prize to be announced. Since the early 20th century, the Nobel Prize has been the ultimate honor bestowed upon humanity's top thinkers – researchers, scientists, writers, and intellectuals – whose inventions and discoveries have significantly impacted society and science. In **Alfred Nobel's** words, those who “have conferred the greatest benefit to humankind.”

Practical Rather than Theoretical Achievements

Looking at the scientific Nobel Prizes, it is hard to overlook a glaring absence. Prizes are awarded in Physics, Chemistry, and Medicine-Physiology – but not in Mathematics. Why? This question became even more poignant after Hebrew University mathematician **Prof. Robert (Yisrael) Aumann** won the Nobel Prize in Economics. Over the years, researchers have offered numerous explanations why the Queen of the Sciences – as scientist and mathematician **Carl Friedrich Gauss** referred to math – is absent from the annual ceremony in Stockholm. Yet none are persuasive, giving rise to numerous urban legends.

One common explanation is that **Alfred Nobel** wanted to encourage practical research and achievements, while back then math was considered highly theoretical. Another suggestion is that at the time his will was drawn up, Nobel knew of an existing prize – the Scandinavian prize for mathematicians. Of course, juicier stories have also circulated. One version (that remains unproven) is that Nobel didn't want the famed Swedish mathematician **Mittag-Leffler** to win, since he was having an affair with Nobel's mistress. A more intricate version is that Nobel was in love with Russian mathematician **Sofya Kovalevskaya**, who in turn was in love with Nobel's nemesis, **Mittag-Leffler**. Either way, Nobel didn't include mathematics in his prize. Matters of the heart aside, this question will likely remain unanswered.

The Prestigious Math Prize

Mathematics may lack a Nobel Prize, but the field is replete with prizes, medals, and awards. Yet only one such prize is considered on par with a Nobel – the prestigious Abel Prize. Presented annually by the King of Norway, it honors mathematicians from around the world for their outstanding achievements.

The story of the Abel Prize goes back to 1897, around the same time the Nobel Prizes were first announced. That year, the Norwegian mathematician **Sophus Lie** first proposed establishing a fund in memory of **Niels Abel**, a Norwegian mathematician considered to be among the fathers of modern algebra and infinitesimal math (calculus). Yet Lie died in 1899 before he was able to fully realize his plan. Three years later, **King Oscar II** of Sweden and Norway announced his willingness to back such a prize, but this too was foiled when the countries split in 1905. It took the Norwegian government one hundred years to dust off the original plans for the prize, which is now awarded on an annual basis. Since 2003 the Norwegian Academy of Science and Letters bestows the Abel Prize, accompanied by a sum of 6 million Norwegian kroner. In 2019, this was equivalent to 2.5 million New Israeli shekels.

Another mathematics award is the Fields Medal, which is awarded every four years to up to four mathematicians under the age of forty. The Fields Medal is intended to honor young mathematicians whose work is deemed extraordinary. The medal is named after the Canadian mathematician **John Charles Fields**, and it was his brainchild. Fields headed the Royal Canadian Institute for Science between 1919-1924. The first Fields Medals were awarded in 1936, and since 1950 it has been given out regularly every four years. Naturally, young mathematicians receive this award for one-off discoveries or breakthroughs. In contrast, the Abel Prize is bestowed upon accomplished researchers for their cumulative work. (**Prof. Elon Lindenstrauss** of the Hebrew University won the Fields Medal in 2010).

An Outstanding Achievement in Computer Science

The Turing Award is another noteworthy scientific prize, recognizing outstanding achievements in computer science. It is given by the Association for Computing Machinery (ACM) and named after **Alan Turing**, the British mathematician considered to be the father of theoretical computer science and artificial intelligence.

Turing, a tragic genius, invented the Turing machine – an abstract model for a universal computing machine, which outlines how a computer works. Yet Turing is largely remembered for his central role in helping the British Army crack Germany's Enigma code during WWII, significantly contributing to the Allies' victory over Nazi Germany. In the collective memory, Turing is remembered for tragically taking his own life in 1954, two weeks shy of his forty-second birthday. Evidently, his suicide was the outcome of the hormonal treatments forced upon him after being convicted of homosexuality – a criminal offence in Britain at the time.

The Turing Award is given every year. Since 2014, the prize stands at \$1 million and is supported by Google. Although eleven Israelis have won the Nobel Prize (including eight from the Hebrew University), five have won the Turing Award (including two from the Hebrew University), and one has won the Fields Medal (**Prof. Elon Lindenstrauss** of the Hebrew University, who won in 2010 for his results on measure rigidity in ergodic theory, and their applications to number theory), no Israeli has ever won the prestigious Abel Prize. Thus, we eagerly await news of the first Israeli mathematician to do so.

12 Israeli Nobel Laureates

To date, 12 Israeli citizens have been awarded the Nobel Prize. The subject area with the most prizes is Chemistry – with six total:

Prof. Avram Hershko (2004), **Prof. Aaron Ciechanover** (2004), **Prof. Ada Yonath** (2009), **Prof. Dan Shechtman** (2011), **Prof. Arieh Warshel** (2013), **Prof. Michael Levitt** (2013).

Three Israelis have received the Nobel Peace Prize: **Menachem Begin** (1978), **Yitzhak Rabin** and **Shimon Peres** (1994). The Nobel Prize in Economics has been awarded to **Prof. Daniel Kahneman** (2002) and **Prof. Yisrael Aumann** (2005). Only one Israeli has won the Nobel Prize for Literature – **Shmuel Yosef Agnon** in 1966.