Karen Uhlenbeck Awarded the 2019 Abel Prize*

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Karen Uhlenbeck (Source: Wikimedia)

The 2019 Abel prize for lifetime achievements in mathematics was awarded for the first time to a woman mathematician, Professor Karen Uhlenbeck. She is famous for her work in geometry, analysis and gauge theory. She has proved very important (and hard) theorems in analysis and applied them to geometry and vice versa. She and some of her collaborators laid the foundation of an area in mathematics known as geometric analysis. She, amongst others, opened up and established gauge theory on a solid ground for mathematical explorations, which is a great gift to mathematical physicists.

While she was in Urbana-Champagne (University of Illinois), Karen Uhlenbeck worked with a postdoctoral fellow, Jonathan Sacks, on singularities of harmonic maps on 2D surfaces. This was the beginning of a long journey in geometric analysis. In gauge theory, Uhlenbeck, in her remarkable 'removable singularity theorem', proved the existence of smooth local solutions to Yang–Mills equations. The Fields medallist Simon Donaldson was very much influenced by her work. Seminal results of Donaldson and Uhlenbeck–Yau (amongst others) helped in establishing gauge theory on a firm mathematical footing. Uhlenbeck's work with Terng on integrable systems is also very influential in the field.

Karen Uhlenbeck is a professor emeritus of mathematics at the University of Texas at Austin, where she holds Sid W. Richardson Foundation Chair (since 1988). She is currently a visiting associate at the Institute for Advanced Study, Princeton and a visiting senior research scholar at Princeton University. She has enthused many young women to take up mathematics and runs a mentorship program for women in mathematics at Princeton.

Karen loves gardening and nature hikes. Having known her personally, I found she is one of the most kind-hearted mathematicians I have ever known.

"The structure, elegance and beauty of mathematics struck me immediately, and I lost my heart to it" – Karen Uhlenbeck on why she took up mathematics.

"All in all, I have found great delight and pleasure in the pursuit of mathematics," Karen Uhlenbeck wrote on one occasion, "Along the way I have made great friends and worked with a number of creative and interesting people. I have been saved from boredom, dourness, and self-absorption. One cannot ask for more."

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Guess Who Said the Following (Note: All Have to Do With Mathematics) !

1. "A person who is able to solve these within a year is truly a mathematician" (talking about solving $x^2 - 83y^2 = 1$ and $x^2 - 92y^2 = 1$).

2. "A mathematician is one to whom $\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$ is as obvious as that twice two make four is to you."

3. "My New Year Resolutions are: (i) To prove the Riemann hypothesis, (ii) To make a brilliant play in a crucial cricket match, (iii) To prove the nonexistence of God, (iv) To be the first man atop Mount Everest, (v) To be proclaimed the first president of the U.S.S.R., Great Britain, and Germany, and (vi) To murder Mussolini."

4. "Computers are useless. They can only give you answers."

5. "On the chessboard, lies and hypocrisy do not survive long. The creative combination lays bare the presumption of a lie; the merciless fact, culminating in the checkmate, contradicts the hypocrite."

Answers

1. Brahmagupta

2. Thompson (Lord Kelvin)

3. G H Hardy

4. Pablo Picasso

5. Emmanual Lasker (a prominent mathematician who was also the world chess champion)