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Carolyn Gordon

Carolyn Gordon amazingly took on the world of math. After completing her B.S. and M.S. at Purdue University by 1972 and finally her Ph.D at Washington University she went on to answer Kac's question of whether or not you can hear the shape of a drum. Her answer was no. Beyond answering Kac's question she has been a professor of mathematics at eight universities. She has also published more than 45 papers and done extensive amounts of colloquiums.

Carolyn has also appealed to women looking for furthering knowledge in the field of math. 25% of all Ph.D.'s awarded each year go to women. More than 50% of all people who acquire Ph.D.'s from Gordon are women. This just shows the work that she puts into helping the field of math become more gender equal.

Math wasn't just her life. After answering Kac's question her and her husband to adopt. So, with all that has gone on in their lives they have made time to build a family. This just goes to show the amazing abilities of Carolyn Gordon.

A **mathematical drum** is any shape in the plane that has an interior and a boundary. The interior vibrates while the boundary determines which frequencies are allowed. Carolyn Gordon, David Webb and Scott Wolpert found two mathematical drums that produce exactly the same sound. When made into real drums, with drumheads of the same material and tension, the two shapes would resonate at exactly the same frequencies.

The Top Two Drums Sound Alike

1. Explain why these drums are considered to be shaped differently.
2. Prove that they have the same perimeter. Explain your work.

3. To prove that they have the same area, cut one of the drums into triangular pieces, along the given lines, and then match up the pieces onto the first drum to show that they have the same area. Did you get them to match up?

It is much harder to prove that the drums sound the same - a mathematical proof is needed.

The Bottom Two Drums

4. Can you show that these drums have the same perimeter and area? Explain how or why not.

