Trevor Evans Award

The Trevor Evans Award, established by the Board of Governors in 1992 and first awarded in 1996, is made to authors of expository articles accessible to undergraduates and published in *Math Horizons*. The Award is named for Trevor Evans, a distinguished mathematician, teacher, and writer at Emory University.

Seth Colbert-Pollack, Judy Holdener, Emily Rachfal, and Yanqi Xu

"A DIY Project: Construct Your Own Multiply Perfect Number!" *Math Horizons*, 28:3 (February 2021) 20–23. doi.org/10.1080/10724117.2020.1849911

This engaging article invites readers along on an active exploration of Multiply Perfect or K-Perfect numbers: positive integers N whose divisors sum to $K \cdot N$ for some K. When $K = 2$, these numbers are the well-known perfect numbers, which, along with multiply perfect numbers more generally, have long intrigued mathematicians. The authors provide a wonderful entry point into the topic with clear definitions, well-chosen examples, a summary of the current status of the search for these numbers, and several surprising open questions, such as whether there exists an odd multiply perfect number, or whether the number of K-perfect numbers is finite, either for a fixed K or in total.

As advertised in the title, the article shares a simple "do-it-yourself" algorithm to construct a multiply perfect number. The steps of this algorithm are presented in a conversational and accessible way, with relevant insight, examples and non-examples, and new definitions provided along the way. Moreover, the authors provide an honest and interesting discussion of the limitations of the algorithm, including how it can fail entirely but also the more nuanced issue of how complex the seed number for the algorithm may need to be in order to result in an undiscovered multiply perfect number. Even so, we challenge any reader to make it to the end of the article without finding paper and pencil to see what multiply perfect numbers they might construct!

Response

We are surprised and honored to receive the Trevor Evans Award, and we are delighted that the algorithm discussed in our paper now appears in print—and in *Math Horizons*! As we explain in our paper, various forms of the algorithm we present have been used since the late 1800's to produce increasingly bigger multiply perfect numbers, and yet details of the algorithm had never been formally published before. We are thrilled that a magazine for undergraduates has closed this gap in the literature because 3 of the 4 authors were undergraduates at Kenyon College when they constructed and analyzed this algorithm (working independently, in tandem, and over several years). These former students express gratitude for the opportunity to explore an ancient open problem in mathematics and to see their work culminate in a *Math Horizons* paper. We want to thank Kenyon College and the Clare Boothe Luce Foundation for funding this work, and we want to send a HUGE shout-out to Tom Edgar, the editor of *Math Horizons*. Tom was instrumental in getting our paper ready for publication, and we are particularly thankful for the clever solution he had for shortening our paper. Additionally, we want to recognize him for being a kind editor.

Biographical Sketches

Seth Colbert-Pollack received his BA in mathematics from Kenyon College in 2019. He lives in San Francisco, where he works as a data scientist at PicnicHealth, a startup that provides patients the ability to browse all of their medical records in one place.

Judy Holdener is a professor in the Department of Mathematics and Statistics at Kenyon College where she has been teaching since 1997. She earned her PhD in mathematics at the University of Illinois in Urbana, IL, and she has taught at the US Air Force Academy, the Harvard Kennedy School of Government, and Carnegie Mellon University. Her mathematical interests include algebra, number theory, dynamical systems and mathematical art.

Emily Rachfal received a BA in mathematics at Kenyon College in 2020 and has recently graduated with an MS in mathematics from the University of Illinois at Urbana-Champaign.

Yanqi Xu obtained her BA in mathematics and philosophy at Kenyon College in 2017. She then worked as an algorithm engineer at Supremind Technology and also a data scientist at Deloitte in Shanghai. In 2019 Yanqi started her graduate study at the NYU Center for Data Science, where she has earned a master's degree and is currently finishing her first year as a PhD student. She is interested in computer vision and its applications in healthcare.