PREFACE MARIANA COOK

Beauty is truth, truth beauty,— that is all
Ye know on earth, and all ye need to know.
John Keats, "Ode on a Grecian Urn"

Mathematicians are exceptional. They are not like everyone else. They may look like the rest of us, but they are not the same. For starters, most of them are a great deal smarter. A mathematician has the capacity to perceive the world abstractly at a remarkable level of sophistication, often moving dozens of what they call "mathematical objects" around in their heads for years while working on a single problem.

Truth is the ultimate authority in mathematics. A theorem must be proven to be true. Often, after a decade of work, a proof will only be a page long. It will be beautiful in its simplicity. I have photographed many people: artists, writers, and scientists, among others. In speaking about their work, mathematicians use the words "elegance," "truth," and "beauty" more than everyone else combined.

Mathematicians are bound by fairness. Anyone who solves an outstanding problem with a pencil and piece of paper (regardless of age, race, nationality, or economic circumstance) can be catapulted into the upper echelons of the mathematical community overnight. Unlike with the scientist, a laboratory is not required to do the work. Mathematics may well be the most democratic of creative pursuits, as is the recognition of success by fellow mathematicians. Honesty and conscience are the tools of character required. The work of the mathematician transcends political bounds.

One of the last mathematicians I photographed for this project is one of the youngest in the book, Maryam Mirzakhani. I interviewed her, and after asking general questions about her initial interest in mathematics, I asked her more specifically about her work. She looked at me quizzically, trying to determine how much I might understand of what she could say. I was touched by her consideration. Then she picked up a cup on her desk and began to talk about the shape of its handle, how that shape could be changed, and what mathematical questions and answers could be raised in the process. Delighted to understand a little bit of it, I told her that another mathematician I'd photographed, Dennis Sullivan, had picked up his cup and explained topology to me in exactly the same way. "He's my mathematical grandfather!" she exclaimed. In case you're wondering, Curt McMullen is the link. There is a notable kinship among mathematicians. Students are appreciative of the time and effort given them by their professors, and in turn, they nurture the next generation.

At age twelve, my daughter asked me if I thought there could be another galaxy in which life as we know it exists. I told her I thought there could be. And, if it ever comes to pass, there is one thing about which I have utmost certainty: the thinking individuals who will be able to communicate between galaxies will be the mathematicians. Why? Because they have developed a language of notation to represent ideas that try to explain truths. Where are we in the universe? How do you measure distance and area that morph into other forms? How can you determine the shape of a drum from its sound? Does infinity exist? The actual language of notation will not be the same, but the "mathematicians" in each galaxy will be able to see patterns in one another's language. They will decipher symbols and soon they will exchange ideas with a respect for their mutual effort to understand. As for the rest of us, well, lots of luck!