

Ramanujan: From Zero to Infinity

Reviewed by Anand Mathew Kurien

The book titled ‘Ramanujan: From Zero to Infinity’ is written by Arundhati Venkatesh and illustrated by Priya Kuriyan. The main character of this children’s storybook is the Indian mathematician Srinivasa Ramanujan (1887 – 1920), as a precocious ten-year-old. While the story is a work of historical fiction, many of the details used in it were inspired by true events of Ramanujan’s life, as mentioned in the ‘Afterword’ of the book.

Introduction

The first thing that I do when I get a book is scan through the contents page. To my surprise, this book did not have one! The most probable reason for the missing page was clearer when I browsed through the pages curiously. I noticed that while there were twenty-three short chapters with titles, there were no direct chapter numbers. Instead, each one was written as a mathematical expression that would give the correct chapter number if solved. Even more interestingly, the expression itself was written in a surprising and mathematically aesthetic manner which I will let the reader explore. These simple mathematical puzzles at the beginning of each chapter should get children curious enough to solve them themselves or could be used by teachers in classrooms as a fun learning exercise.

Many numerical relations are introduced in the first chapter as relations that Ramanujan had thought of while having a bath! These are simple relations that students above the ages of 11 or 12 will be able to understand. For example,

$$100^2 + 75^2 = 25^3 = 120^2 + 35^2 = 117^2 + 44^2.$$

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This is one of many such numerical relationships given in the book. Surely, none of *us* think like this! It may even prompt the question “Who thinks like that?!” or to the less mathematically inclined, “So what?” The author intends to give us a glimpse into the deep relationship that Ramanujan had with numbers and his fondness for playing with them. It reminds me of the quote by J. E. Littlewood, one of Ramanujan’s colleagues from Trinity College in Cambridge, “*Every positive integer is one of Ramanujan’s personal friends*”¹. The genre of historical fiction must attempt to make extrapolations of historical facts into fiction. This book captures, rather well, the essence of how Ramanujan’s mind would have worked while he was ten years old.

The Story

The book begins by introducing us to Ramanujan, his mother, and their home, briefly touching upon his extended family in the first chapter. In the following chapters, we meet his friends – a familiar, fun-loving, noisy bunch – and his school. Ramanujan and his friends are all in the same class, the first form. The story follows the young friends and describes the events surrounding their lives at home and in school, the primary theme being a mathematics contest that is to be conducted that year between two teams in their class. As a children’s storybook, it captures themes that would interest children. The light-hearted fun that ten, and eleven-year-old boys have is well depicted, as they pull each other’s legs, say silly things, laugh uproariously, tease each other, and on occasion are mean to one another. Their interests, fears, and frustrations come through, bringing the characters to life. Ramanujan is portrayed as a child who lives almost perpetually in his head with mathematical and numerical ideas, speaking mostly only to share his hilarious – often bilingual – puns, or puzzles with his friends. This is almost always followed by them making fun of him or mentioning how they are tired of his obsessive mathematical nagging.

¹ https://en.wikiquote.org/wiki/John_Edensor_Littlewood

The relationship between Ramanujan and his mother is portrayed in vivid detail in the book and appears in several chapters. His mother knows that her ‘Chinnaswami’, as she calls him, is uniquely gifted, and puts up with his idiosyncrasies and does her best to provide for him. She takes immense pride in him and attributes his gifts to the Gods.

The early chapters introduce the characters and the context. Subsequently, the author alternates the narrative between the main theme and sub-themes that cover social issues and short incidents that take place in the neighbourhood. The final few chapters bring a logical end to the contest with a very heart-warming finish. As mentioned earlier, the ‘Afterword’ at the end of the book gives context to these subplots, sifting fact from fiction and mentioning the facts that were used in the story, but under a different context. The book also dedicates a couple of pages, in the end, to providing solutions to the mathematical puzzles mentioned in the book.

Use of Language and Style

From a stylistic point of view, the author’s descriptions of events and places are so vivid that it takes little effort to imagine the setting, the surroundings, the people, and their mood in the scene. The characters’ spoken English, coloured with the influence of Tamizh, is true to life. The ten illustrations in the book add to the flavour and contain accurate details as in the textual description. The book also introduces the reader to many customs, traditions, and a host of traditional names of Tamizh Naadu – of people, places, streets, temples and food, with one chapter containing a rich and delightful description of sweets and savouries.

One of the moments that I enjoyed is in Chapter 14, where one of Ramanujan’s friends speaks with his nose pinched closed. The author describes how he speaks so lucidly that I found myself reading it out loud, with my nose closed, to check if it really sounded like that. It did!

The use of vocabulary is such that even adults will be able to enjoy the book while teenagers will have good fun reading and learning some new words that may not yet be part of their repertoire. Overall, there is drama – sometimes to a slightly unrealistic degree, but well within the confines of artistic freedom – a pinch of suspense, and lots of values such as friendship and forgiveness, which combine to make it an enjoyable work of historical fiction.

The ‘Uncommon’ Sense

My favourite moment in the book is when during one of the competitions in the math contest, in Chapter 14, Ramanujan comes up with a brilliant solution while his friend comes up with an offbeat ‘uncommon sense’ solution which leaves Ramanujan and his friends dumbstruck. Ramanujan says, “I hadn’t thought of that!” Amid all the mathematical brilliance of Ramanujan displayed in the book, the author makes it a point to emphasize that one does not always need to be brilliant to come up with a solution to a problem!

This offbeat solution reminded me of “*Angels on the Head of a Pin: A Modern Parable*” by Alexander Calandra² where a physics question is posed: “Show how it is possible to determine the height of a tall building with the aid of a barometer.” While there are many creative solutions to the problem, the simplest and most ‘uncommon’ sense one is quoted as – *Probably the best is to take the barometer to the basement and knock on the superintendent’s door. When the superintendent answers, you speak to him as follows: “Mr. Superintendent, here I have a fine barometer. If you tell me the height of this building, I will give you this barometer.”*

Social Issues Addressed in the Book

The author has dedicated three chapters to bring to light prominent social concerns of the time, that remain relevant to Indian society even today, including patriarchy and injustice

against women and girl children. Considering that the story is set over a century ago, it is a rather clear indicator of how we, as a society, are over a century old in our mindsets when it comes to certain aspects of our social outlook. These three chapters intertwine social issues with the story very naturally. One of these (Chapter 21) was particularly moving, depicting with sincerity the agony and anguish of a ten-year-old boy. The author also brings out with clarity the hypocritical inconsistencies in the behaviour of adults portraying how they don’t live up to the standards that they expect their children or others to live up to. The most important takeaway here is that these social issues have not been resolved in the intervening century and remain predominant in our society even today.

Ramanujan’s Genius

Srinivasa Ramanujan’s story is unconventional and one of a kind. He was self-taught and had a unique approach to mathematics. So profound were his abilities that he became one of the youngest Fellows of the Royal Society and the first Indian to be elected a Fellow of Trinity College, Cambridge. He could see connections between numbers that no one else could see, which is well depicted in the book’s first chapter. In early 1913 when Ramanujan reached out to mathematician G.H. Hardy in Cambridge through letters with a long list of his mathematical discoveries, Hardy immediately recognized his genius and invited him to come to England to work with him. J.E. Littlewood said that the discoveries must be true as no one would have the imagination to invent them, and Hardy stated that with just a single look he knew that it could only be written by a mathematician of the highest class and compared him with other mathematical geniuses such as Euler and Jacobi.

Ramanujan had deep intuition and is considered the ‘greatest intuitionist’ that the mathematical world has seen. His ability to come up with solutions to conjectures without proof was

² <http://www.rbs0.com/baromete.htm>

prolific given that he only lived for 32 years. It was not a few dozen or a few hundred solutions to conjectures that he came up with, but as the Afterword of this book states, *“it took some of the world’s best mathematicians years to make sense of the 3000 theorems, without proofs, Ramanujan left behind in his notebooks”*. How he did this, nobody knows. Ramanujan himself credited his deep insights to his family Goddess, Naamagiri.

For those who would like to learn more about the life and work of Ramanujan, Robert Kanigel's book, *“The Man Who Knew Infinity”* is highly recommended. This book was reviewed in At Right Angles (Volume 2, No. 3, November 2013).

Errata

One typographic error was spotted on page 91 (*‘amin’* instead of *‘admin’*). There was also a mathematical error on page 123 ($\sin 45^\circ = 1$ instead of $\tan 45^\circ = 1$) which, given the number of mathematical ideas and equations used in the book, is surely a slip of the pen.

Conclusion

A substantial amount of research, thought, and creativity has gone into bringing out the breadth of themes covered in this book. Yet the author makes it seem so simple in this small, 160-page children’s book with vivid illustrations. The author, in the process of telling a story of friendship, intertwines language, mathematical riddles, puns, puzzles, fun stories, humour, and important social issues in this book. It also introduces a reader, unfamiliar with Tamizh Naadu, to its traditions, culture, and food, along with a host of traditional names. All of this is done while the author gives us a glimpse into the mind of the strange and rare genius phenomenon of nature called Srinivasa Ramanujan! It was surely no easy task to maintain the graceful balance of all the themes covered in the book and ensure the book is also fun to read, but the author has managed it masterfully.



ANAND MATHEW KURIEN is a faculty member in the Teacher Education group at Azim Premji University in Bengaluru. Before this role, he taught physics and music in schools in Chennai for over a decade. Though his core passions are conveying physics and music to an uninitiated audience and making video content for online platforms, he continues to be an ardent mathematics enthusiast. He uses his channel www.youtube.com/@anandmkurien to share ideas. He may be contacted at anand.kurien@apu.edu.in