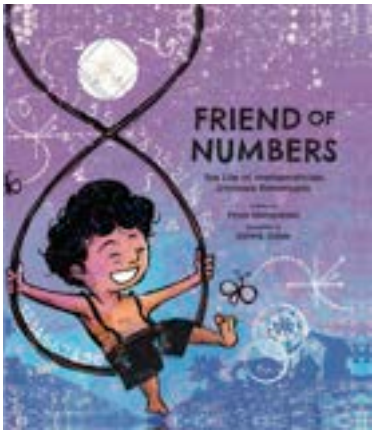

Friend of Numbers

What number patterns have you noticed?

Topics: patterns, mathematician, mathematical research

AUTHOR:
Priya Narayanan

ILLUSTRATOR:
Satwik Gade

This is the life story of a boy who loved numbers. Math was all he wanted to learn about and was able to see number patterns that others did not. He grew up to become a great mathematician.

Ages: 7 to 9 years

Lexile: n/a

ATOS Reading Level:
n/a

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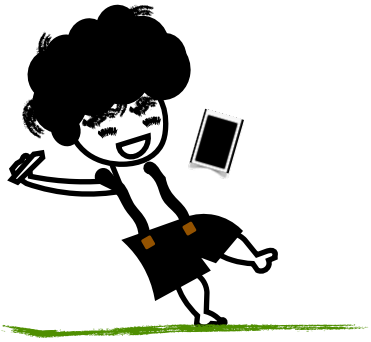


Activities To Do Together:

Friend of Numbers is the life story of Srinivasa Iyengar Ramanujan, a great mathematician from Southern India. Ramanujan was fascinated by numbers and the patterns he discovered. Patterns are all around us. Some patterns are in numbers, some in shapes, and others are in nature.

Before reading the book:

- Ask your child to tell you what they know about mathematicians. Ask them who they are and what they do. Explore together how mathematicians use numbers, patterns, and data to make decisions and solve problems.
- Mathematicians are people of all ages and genders. Share that you will be reading about one mathematician who lived a long time ago.
- Ask your child to tell you what they enjoy most about math and about a time when they've used math to make a decision or solve a problem.

While reading the book:

- There may be some words that are unfamiliar to your child. There is a glossary of words at the back of the book. Look up words with your child if they are unsure of the words' meaning.
- Ramanujan asks a lot of questions. Ask your child about their own questions regarding numbers and patterns.

When you have finished reading the book:

- With your child, locate India and England on a map. How far did Ramanujan travel from India to Cambridge, England? How far is it from your home to India? To England?
- Talk about how travel has changed over time. Ask your child what aspects of travel they think would be most enjoyable both now and when Ramanujan was alive.
- Ask your child how they think Ramanujan must have felt leaving India. What were some of the challenges he faced?
- Encourage your child to make number patterns with a partner. Your child and their partner could take turns making patterns and figuring out each other's patterns.

Questions for Mathematical Thinking:

1. The book doesn't say *how* Ramanujan traveled to England. Do you think he took a plane, a car, or some other form of transportation? Why do you think so?
2. What number patterns have you noticed? Where did you notice them?
3. What number do you think comes next in this pattern? Describe how you know that is the next number.
   1, 1, 2, 3, 5, 8, 13, __
4. How would you describe Ramanujan to someone who had never heard of him. What do you think was important to him?
5. Do you think the title of the book *Friend of Numbers* describes Ramanujan well? Why or why not?

Early Math Project Resources:

Visit Activities for Friend of Numbers (www.earlymathca.org/friend-of-numbers)

Follow this link or visit earlymathca.org/external-resources for additional online resources.

Vocabulary

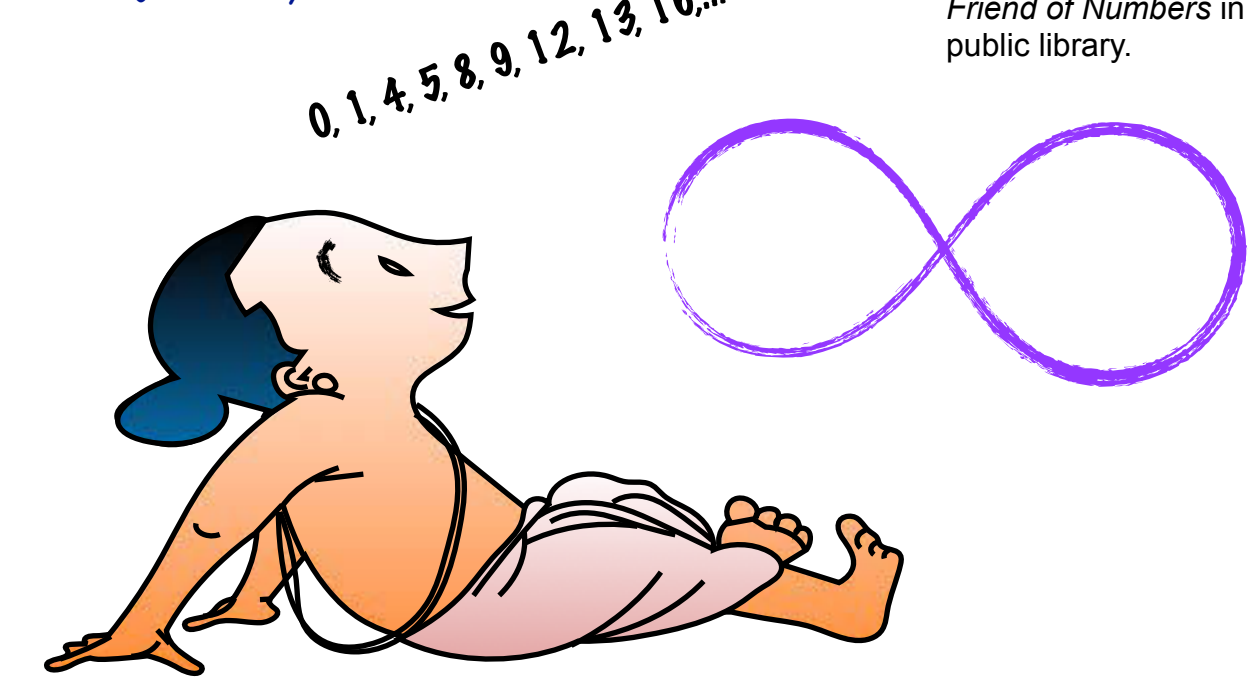
Math words found in the story: calculate, combinations, composite, equation, even, fractional, odd, patterns, prime, whole

Related math words: infinite series, infinity

Words to build reading comprehension: coiled, equator, fascinated, immersed, lentils, mathematician, meandered, ordinary, ripple, slunk, vegetarian

Related Books: *Ada Twist Scientist* by Andrea Beaty; *Rosie Revere Engineer* by Andrea Beaty

Click this link to the World Catalog or enter bit.ly/3UrdbN8 to find *Friend of Numbers* in the public library.



Math Connections: Ramanujan was a self-taught, great mathematician. All he could think about were numbers and the patterns they create. He lived more than 100 years ago, before computers, calculators, and many other modern inventions. All of his calculations were done by hand. As he solved problems, he didn't always get the answer correct on the first try, but he persisted and kept trying until he did. This is known as a growth mindset. This is very important for children (and adults!) to develop. Talk with your child about why it is important to keep trying. Ask them to think of something they used to find difficult but can do easily now.

He also persisted in finding a mentor, someone he could study with. He wrote to many professors at Cambridge University before one of them said, "Yes, you may study with me." Although some people tried to dissuade him, Ramanujan pursued his dream of becoming a mathematician. Ask your child what they would do in Ramanujan's place.

Ramanujan enjoyed discovering and exploring mathematical patterns. One place to start exploring patterns is on a 100 chart. There is a printable one on our website (earlymathca.org) or your child can create their own. A 100 chart is the numbers 1 to 100 written in 10 rows of 10. Your child may enjoy finding all the multiples of 3 and coloring in those squares. Another place to explore patterns is in a multiplication chart. Encourage your child to tell you about the patterns they notice on a 100 chart or multiplication chart.

Ramanujan's amazing mathematical contributions extend to fields such as complex analysis, number theory, infinite series, and continued fractions. Although these topics are in higher mathematics, they are all rooted in arithmetic. Many of these mathematical fields are used today to develop video games, space travel, cell phones, and other inventions. Future careers will still rely on the mathematics that Ramanujan explored many years ago. Together, explore how math is used in a career your child is interested in. What level of education does the career require?

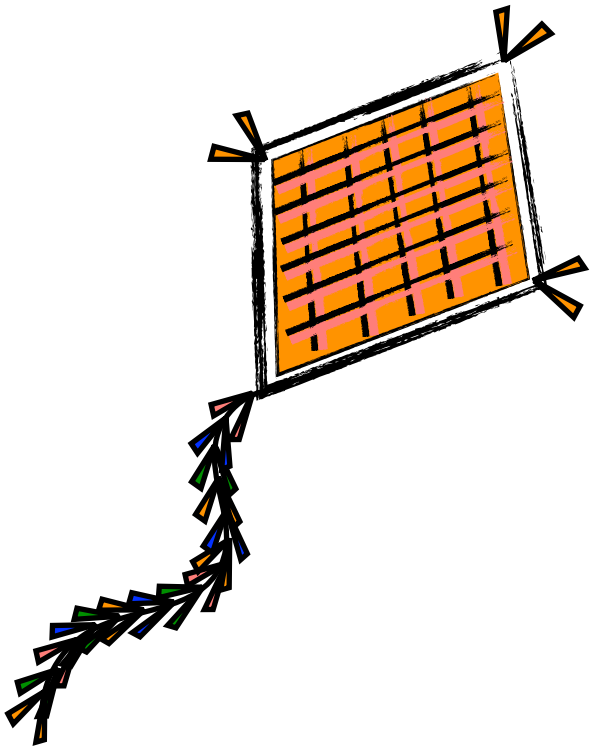
X	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

Multiplication Chart

Pi ≈ 3.14159265359...

1, 10, 100, 1,000, 10,000, 100,000, 1,000,000...

Age Level	Related CA State Standards
Grade 2	**Mathematical Practices** 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 7. Look for and make use of structure.
Grade 3	**Operations and Algebraic Thinking 3.OA.8,9** Solve problems involving the four operations, and identify and explain patterns in arithmetic. **Mathematical Practices** 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 7. Look for and make use of structure.

15	4	17
14	12	10
7	20	9

Magic Square