



# The Secrets Behind

## Problem Posing & Solving

Hara Gopal R

# **The Secrets Behind Problem Posing & Solving**

**Hara Gopal R**

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Copies can be had from:

**R. Hara Gopal, SA – Maths,**

Municipal High School (Main),

Near old Control Room,

Kurnool

9885911608,

[rharagopal@gmail.com](mailto:rharagopal@gmail.com)

**Price: 80/-**

# *Preface*

In the 12 years of my teaching experience I found many students with lot of creative thinking as well as those who lack creative thinking. When I started trying to find the reason behind this gap, I came to know that nowadays the mathematical education in schools is restricting the students only up to solving problems where most of the students are depending on the teachers or any other reference sources for the solution. This is the reason why nowadays most of the students face problem with mathematics, where the problem solving has become an added problem to them.

In the present competitive educational system where only marks' scoring is given importance, students have restricted themselves only to the method given in the textbook instead of exploring themselves to many other ways of problem solving.

In order to make mathematics students friendly by this book a conscious attempt has been made to simplify concepts, to facilitate better understanding of the subject, so that students would here by love to solve

problems through various methods and also improve their creative thinking.

In this book along with the problems and their solutions I have also included the concepts behind each & every problem that would help the students for the analysis, some interesting facts about mathematics which really would surprise you and also create interest towards the subject.

The book has been organized and executed with lot of care and dedication. I hope every word in this book would help you relish the real joy hidden in mathematics.

Constructive criticism and suggestions for further improvement of the book would be most welcome.

- Hara Gopal R

[rharagopal@gmail.com](mailto:rharagopal@gmail.com)

# Contents

<i>Topic</i>	<i>Page No</i>
1. The Historical Problem of Ramanujan	1
2. Problem Set 1	5
3. Ramanujan's view of squaring the circle.	27
4. Problem Set 2	31
5. Balancing numbers	55
6. Problem Set 3	59
7. Some Non Routine problems	73
8. Problems proposed by the students	79

## The Historical Problem which changed the Indian Face in Mathematics through Ramanujan

Everybody knows that after sending many results in his letters to Cambridge University Ramanujan got the chance to do his researches in Mathematics there. Mr. G.H. Hardy is the person who plays vital role in this process. He was very much surprised and impressed a lot with the results what Ramanujan sent. Here I am going to introduce one of those interesting and most shocking result of mathematics.

That is .....

$$1 + 2 + 3 + 4 + \dots + \infty = -\frac{1}{12}$$

It seems to be a foolish result which was sent by Ramanujan to the Cambridge University.

Everybody laughed at this result, because

**How the sum of positive numbers will be a negative quantity?**

**And how the sum of integers will be a fraction?**

But Ramanujan gave an intellectual proof of this. Here I am posing an alternate proof of this which is easy to understand even by the school children.

Let us assume the given series as **S**

$$\text{i.e. } S = 1 + 2 + 3 + 4 + \dots + \infty = -\frac{1}{12}$$

Let us consider the series

$$1 - 1 + 1 - 1 + 1 - 1 + \dots \infty$$

It seems to be either 1 or 0 is the value of entire sum, but which is  $\frac{1}{2}$

Let us assume the entire series

$$\begin{aligned} S_1 &= 1 - 1 + 1 - 1 + 1 - 1 + \dots \infty \\ &= 1 - (1 - 1 + 1 - 1 + 1 - \dots \infty) \\ &= 1 - S_1 \end{aligned}$$

$$2. S_1 = 1$$

$$S_1 = \frac{1}{2} \quad \text{---- (1)}$$

And let us consider another series of numbers

$$1 - 2 + 3 - 4 + 5 - 6 + \dots \infty$$

This series also easily misleads everyone to the wrong answer

Let us consider the entire series as  $S_2$

$$S_2 = 1 - 2 + 3 - 4 + 5 - 6 + \dots \dots \dots \infty$$

$$S_2 = 1 - 2 + 3 - 4 + 5 - 6 + \dots \dots \dots \infty$$

Let us add the both

$$2S_2 = 1 - 1 + 1 - 1 + 1 - \dots \dots \dots$$

$$2S_2 = S_1 = \frac{1}{2}$$

$$S_2 = \frac{1}{4} \quad \text{---- (2)}$$

Now let us consider  $S - S_2$

$$S - S_2 = (1 + 2 + 3 + 4 + \dots \dots \dots \infty) - (1 - 2 + 3 - 4 + 5 - 6 + \dots \dots \dots \infty)$$

$$= 4 + 8 + 12 + 16 + \dots \dots$$

$$= 4 (1 + 2 + 3 + 4 + \dots \dots \dots \infty)$$

$$S - S_2 = 4S$$

$$S - 4S = S_2$$

$$-3S = \frac{1}{4} \quad \text{[From (2)]}$$

$$S = -\frac{1}{12}$$

$$\therefore 1 + 2 + 3 + 4 + \dots \dots \dots + \infty = -\frac{1}{12}$$

This is why Ramanujan is only mathematician came to be known as

**“Man who knows Infinity?”**

I take immense pleasure to start this small book with a great problem of ever great genius.

I don't want to take any risk to comment on the creation of this problem. But this problem made my nights sleepless for a long time.

I was thinking for so many days that how he got the idea of this problem. From which problem or situation he got inspired to think in the way of infinity.

As I came to know that Ramanujan gone through the book named as **"Synopsis of Mathematics"** which was written by G.S. Carr. From this book he got inspired towards mathematics.

So I understood that every problem will be created just by inspiring from some other problem or a situation.

I hope this book will create many such opportunities to you.

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**End of Preview.**

**Rest of the book can be read @**  
**<http://kinige.com/book/The+Secrets+Behind+Problem+Posing+and+Solving>**

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