

# **Empowering the Mathematics Teacher: Innovative practices to enliven the mathematics classroom**

A Workshop for mathematics teachers

Organized by

**Ramanujan Foundation for Initiatives in Mathematics Education  
in collaboration with**

**Ramanujan Mathematical Society,**

**Azim Premji University and Sanskriti School**

**2<sup>nd</sup> & 3<sup>rd</sup> May 2014**

## **A Report**

A two – day workshop was conducted by the Ramanujan Foundation for Initiatives in Mathematics Education (RFIME) as a part of its ongoing professional development programmes for mathematics teachers of schools in Delhi. The workshop was organized in collaboration with Azim Premji University (APU) and the Ramanujan Mathematical Society (RMS) at Sanskriti School, New Delhi. 40 teachers from 17 schools across Delhi and Gurgaon participated in the workshop. The workshop focused on

- Problem solving sessions which excite the mathematical curiosity of the student.
- Discussion of applications of mathematics which highlight the relevance of mathematical concepts taught at the secondary and senior secondary level.
- Discussion of articles from At Right Angles involving a historical perspective of mathematics or an interesting classroom experience.
- Lectures on mathematical topics related to the curriculum.

The sessions of the workshop were conducted by Professor Geetha Venkataraman from the Ramanujan Mathematical Society (RMS) and Dr. Jonaki Ghosh, RFIME and Dr. Haneet Gandhi, RFIME. The programme schedule of the workshop is given at the end of the report. Articles from various issues of At Right Angles were used as the reference material for the sessions conducted by the RFIME resource persons.

**Session1 : *Learning Mathematics Through Problem Solving*** was conducted by Dr. Jonaki B Ghosh. It was an interactive session on exploring various approaches to problem solving. Many of the problems discussed in this session were taken from the problem corner section of the At Right Angles.

**Session2 : *A Fascination for Counting*** was conducted by Dr. Haneet Gandhi. It was based on counting problems discussed in the article *Math Club: A fascination for counting*.

**Session3 : *Learning Mathematics Through Problem Solving (contd.)*** was conducted by Dr. Jonaki B Ghosh. It was an interactive session on exploring various approaches to problem solving. The friendship problem leading to Ramsay numbers was discussed in detail and a reference was made to the article *Paul Erdos: The Artist of Problem Posing*.

**Session 4 : *Tessellations*** was conducted by Dr. Haneet Gandhi. It was a hands on session on exploring the art of tiling the plane, leading to a discussion on semi-regular tessellations. The articles *Covering the plane with repeated patterns, part 1* and *Enumeration of semi-regular tessellations* formed the basis of discussions during this session.

**Session 5: *Quadratic, quartic and Cubic Equations*** was conducted by Professor Geetha Venkataraman from Ambedkar university. The session focused on the history of equations and their solutions.

**Session 6: *Using Spreadsheets to Enhance Mathematical Thinking***. This was a hands-on workshop on MS Excel and were based on exploring Fibonacci Numbers, The Birthday Paradox and the Monty Hall Problem. Participants learned to simulate these problems on MS Excel. The relevant articles from the tech space section of the magazine were used as the reference material for this session.

**Session 7: *How to Prove it*** was an interactive session on the nature of Mathematical Thinking and proof. It was jointly conducted by Dr. Haneet Gandhi and Dr. Jonaki Ghosh. Various proofs of the Pythagoras theorem were discussed from the first issue of the magazine. An exploration of the generalised trapezium theorem using GeoGebra was also demonstrated.

During the closing session a feedback was taken from the participating teachers on a questionnaire. The questionnaire is included at the end of the report. The feedback of the teachers has been very encouraging. All the sessions of the workshop were well received and they are keen to integrate some of the activities in their classroom. **It was announced that a follow up workshop will be organised in October 2014, where each participating school will give a short presentation on how they integrated some activities in their classrooms.** Some participants also showed interest in contributing articles for the magazine.

## Workshop programme schedule

Friday, 2<sup>nd</sup> May 2014

8:00 am	<b>REGISTRATION OF PARTICIPANTS</b>
9:00 am	<b>INAUGURAL SESSION</b> <ul style="list-style-type: none"><li>• Welcome of participants</li><li>• <i>About RFIME</i>, an introduction to the activities of the Foundation by Dr. Jonaki B Ghosh, RFIME</li><li>• Introduction to the theme of the workshop, by Dr. Haneet Gandhi, RFIME</li></ul>
9:15 am	<b>Session1 : <i>Learning Mathematics Through Problem Solving</i></b> An interactive session on exploring approaches to problem solving by Jonaki B Ghosh, RFIME
10:30 am	TEA
10:45 am	<b>Session2 : <i>A Fascination for Counting</i></b> A Math Club Activity by Haneet Gandhi, RFIME
12:00	<b>Session3 : <i>Learning Mathematics Through Problem Solving (contd.)</i></b> An interactive session on exploring approaches to problem solving by Jonaki B Ghosh, RFIME
1:00 pm	<b>LUNCH</b>
1:30 pm	<b>Session 4 : <i>Tessellations</i></b> A hands on session on exploring the art of tiling the plane by Haneet Gandhi, RFIME

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**Saturday, 3<sup>rd</sup> May 2014**

8:30 am	<p style="text-align: center;"><b>Session 5: <i>Cubic Equations</i></b>  An Interactive Session  by  Professor Geetha Venkataraman, School of Undergraduate Studies,  Ambedkar University</p>
10:30 am	TEA
11:00 am	<p style="text-align: center;"><i>Session 6: Using Spreadsheets to Enhance Mathematical Thinking</i>  A hands on workshop session on Excel  by  Dr. Jonaki B Ghosh, RFIME &amp; Ms. Sangeeta Gulati, Head, Dept. of  Mathematics, Sanskriti School</p>
1:00 pm	<b>LUNCH</b>
1:30 pm	<p style="text-align: center;"><i>Session 7: How to Prove it</i>  An Interactive session on the nature of Mathematical Thinking  by  Dr. Jonaki B Ghosh</p>
3:30 pm	<p style="text-align: center;"><b>Valedictory Session</b>  Summary of the programme  Feedback session.  Vote of Thanks</p>

**PARTICIPANT FEEDBACK FORM**

Name: \_\_\_\_\_

email: \_\_\_\_\_

Ph. nos:      Res: \_\_\_\_\_ Mobile: \_\_\_\_\_

Your overall opinion about this workshop:

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Which sessions did you find particularly useful and why?

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How would you like to integrate these activities in classroom teaching?

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Any other suggestions:

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Please rate each session conducted during the workshop on a scale of 5 (where 1 indicates least effective and 5 indicates most effective). Your rating for each activity may be based on whether you think it will enhance conceptual understanding or generate student's interest in a particular topic. (put a tick in the appropriate box)

**Friday 2<sup>nd</sup> May 2014**

Sessions	1	2	3	4	5
Learning Mathematics Through Problem Solving					
A fascination for counting					
Tessellations					

**Saturday 3<sup>rd</sup> May 2014**

Sessions	1	2	3	4	5
Quadratic, quartic and cubic equations					
Using spreadsheets to enhance mathematical thinking					
How to Prove it					

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