Homi Bhabha Centre for Science Education, TIFR, Mumbai
Enrichment Workshop for Mathematics Teachers and Subject Specialist
Program Sponsored by Department of Science Technology, Haryana
June 19th to 23rd, 2018

Time	19th June 2018	20th June 2018	21st June 2018	22nd June 2018	23rd June 2018
08:30 am - 9:30 am	Breakfast and Registration Smita Burli [Main Building G1]	Breakfast [Main Building]	Breakfast [Main Building]	Breakfast [Main Building]	Breakfast [Main Building]
09:30 am - 11:00 am	**Processes in Mathematics** K. Subramaniam [Main Building G1]	**Volume of a Sphere: Historical Exploration** K. Subramaniam [Main Building G1]	**Tasks to Explore Geogebra - Batch II through Geogebra** Harita Raval [NIUS 101]	**Pedagogical Content Knowledge Part 1** Shweta Naik [Main Building G1]	**Classroom Activities for Geometric Reasoning** Jeenath Rahaman [Main Building G1]
11:00 am - 11:30 am	Tea [Outside G1]		Visit to Nehru Science Centre	Tea outside G1	
11:30 am - 01:30 pm	**Problem Solving** Aaloka Kanhere [Main Building G1]	**Tasks to Explore Geogebra -- Batch I** Harita Raval [NIUS 101] Mathe		**Global and Local Proofs** Arindam Bose [Main Building G1]	**Reading Presentation – I** [Main Building G1]
01:30 pm-	Lunch [NIUS Canteen]			Lunch [NIUS Canteen]	

02:30 pm					
02:30 pm - 04:00 pm	**Algorithm Development by Playing Games and Puzzles** Rossi D'Souza [Main Building G1]	**Students' Misconceptions in Vectors** Durga Prasad [Main Building G1]		**Models of Learning and Classroom Interaction** Sunil Bajaj [Main Building G1]	**Reading Presentation – II** [Main Building G1]
04:00 pm - 04:30 pm	Tea [Outside G1]			Tea [Outside G1]	
04:30 pm - 06:00 pm	**ICT in Teacher Education** Ruchi Kumar [Main Building G1]	**Geometric Constructions** Aaloka Kanhere [Main Building G1]		**Pedagogical Content Knowledge Part II** Shweta Naik [Main Building G1]	**Conclusion, Certificate Distribution** [Main Building G1]
06:00 pm - 6:30 pm	**Distribution of Readings, Feedback Session** Sunil, Shweta and Gayatri [Main Building G1]	**Distribution of Classroom Interaction Assignment and Feedback Session** Sunil, Shweta and Gayatri [Main Building G1]		**Reading Presentation Outline, Feedback session** Sunil, Shweta and Gayatri [Main Building G1]	

Session Descriptions:

Problem Solving -- Aaloka Kanhere: In this session we will solve some problems relating to numbers and try to get motivated towards understanding the basics of modulo theory.

Geometric Constructions -- Aaloka Kanhere : Geometric Constructions are very crucial part of the geometric curriculum. But in our curricula, geometric constructions are looked at as ready-made recipes. In this session we will work on finding mathematical justifications of the classical geometric constructions and work towards some new constructions.

Pedagogical Content Knowledge -- Shweta: Few examples from secondary schooling will be discussed to illustrate what kind of knowledge for teaching is useful, and how do we learn to notice that within practice of teaching.

Global and Local proofs -- Arindam: Based on Lakatos's idea of local and global proofs, few examples from students' work will be discussed to understand what makes something a proof in mathematics.

Models of learning -- Sunil Bajaj-with examples as introduction of Euclid's Division lemma , coordinate geometry, area etc. moving known to unknown and then generalisation of facts.
Also on 3D Geometry by physical model , integral calculus and differential calculus in daily life or upper primary fractions and integers or any as desired by participants

Using tasks to explore Geogebra -- Harita -- In this session we will try to explore Geogebra through some tasks. Some of the tasks are constructing rhombus, finding the sum of angles of a triangles and quadrilaterals. The session aims at preparing the participants in developing a comfort with Geogebra.

Geometric constructions through Geogebra -- Harita -- This session is an extension of both my Geogebra session and Aaloka's Geometric Constructions session. In this session the participants will actually construct the geometric constructions they had found in Aaloka's session using the understanding of Geogebra they have developed in the earlier Geogebra session.

Activities to have Geometric Reasoning in the classroom --***Jeenath***: Building on the work done on the classical theory of van Hiele levels of Geometric reasoning, in this session, we will try to make some activities to bring higher level of geometric reasoning in the classroom. A computer lab type of class with a projector and a board and with internet and geogebra in each computer will help us in exploring some existing resources in this regard.

Algorithm development by playing games and puzzles -- Rossi: In this session, the participants will be divided into two teams. The first part of the activity will begin with the nim game. After the players have discovered the winning strategy, the second part will involve explicating their discovered strategy in the form of an algorithm which will have to be executed by a players from opposing teams. The more clear is their algorithm, the better will be their possibility of winning/solving. Different algorithms of solving the tower of hanoi puzzle will be discussed and if time permits, players will have to execute their opponent's algorithm. The importance of the process of developing algorithms will be explored.