RAM Math Circle - Chennai

Synopsis for February 21 2026

Junior Batch

We began this session by recalling the concepts of congruency and similarity of triangles and other geometric shapes. We reviewed why SSA (ASS) is not a valid congruence criterion and understood why SSS is a valid congruence criterion. We solved problems on triangle congruency from the worksheets given to the students earlier. Towards the end, students from both batches played **The 15 Game** (tic-tac-toe).

Rules for the game

- Two players alternate choosing digits from $\{1, 2, \ldots, 9\}$.
- Each digit may be chosen only once.
- A player wins if **any three** of their digits sum to 15.
- If all digits are taken and no one wins, the game is a draw.

Winning Condition: A player wins immediately upon holding three digits whose sum is 15.

Two Short Examples of Play

Example 1: Quick Win

- Player A takes **9**
- Player B takes **5**
- Player A takes **4**
- Player B takes **6**
- Player A takes **2**
- Player B takes **3**

Player B wins because

$$6 + 5 + 4 = 15.$$

Example 2: Defensive Play

- Player A takes **5**
- Player B takes **2**
- Player A takes **8**
- Player B takes **6**
- Player A takes **1**
- Player B takes **7**

No player has three numbers summing to 15; play continues or the game ends in a **draw**.

All Possible Winning Triplets

$$(8,1,6) \quad (3,5,7) \quad (4,9,2) \quad (8,3,4)$$
$$(1,5,9) \quad (6,7,2) \quad (8,5,2) \quad (6,5,4)$$

The Magic Square Notation

8	1	6
3	5	7
4	9	2

Every row, column, and diagonal sums to 15.

Connection to Tic-Tac-Toe

15 Game

- Digits 1–9
- Win = sum of 3 digits is 15
- 8 winning triplets
- Digit 5 is most powerful

Tic-Tac-Toe

- 3×3 board
- Win = three in a row
- 8 winning lines
- Center square is most powerful

Senior Batch

In the last session before we close for the break, we solved a few more exercises using synthetic division for divisors of any given degree to solidify our understanding of the method.

1. Divide $2x^4 - x^3 - 29x^2 + 26x + 48$ by $x - 3$.
2. Divide $8x^4 - 2x^3 + 7x^2 - 5x + 1/3$ by $x^2 + 2x + 3$.
3. Divide $x^6 + 4x^5 + 8x^3 - 9x + 2$ by $x^3 + 2x^2 + 3x + 1$.

Students took turns solving these exercises on the board. The notation was a little complicated for some, but in time everyone got it.

The session closed with a discussion on the relation between the degree of a polynomial and the parity of the number of real roots. The discussion was based on the graph of the polynomial. Without planning to do so, we ended up exploring how Newton's bisection method for finding the root of a polynomial. The students found this discussion quite exciting and we ended with the promise of exploring more such methods next year.

All in all, it was a good ending to a year of mathematical exploration!
