

Nashik Maths Circle

February 21, 2026

Delhi Public School, Nashik

Session Overview

The Nashik Maths Circle session on February 21st was led by Mr. Omkar Sambare. The session featured a "mixed bag" of advanced problems, challenging students to integrate various mathematical disciplines to find solutions.

Diverse Mathematical Disciplines

The problem set was intentionally broad, requiring students to pivot between different mathematical tools and theories:

- **Geometry:** Challenges involving spatial reasoning and structural properties.
- **Combinatorics:** Problems centered on counting, arrangement, and systematic selection.
- **Probability:** Exercises that required calculating the likelihood of complex events through logical deduction.

Problem-Solving Methodology

The session introduced students to a spectrum of mathematical tools, ranging from the fundamental to the sophisticated:

- **Sophisticated Methods:** Utilizing advanced Permutations and Combinations to solve high-level counting and probability problems.
- **Fundamental Methods:** Applying pattern finding and inductive reasoning to break down complex structures.
- **Tool Integration:** Students learned how to choose the most efficient "tool" for a specific problem type, a key skill in advanced competitive mathematics.

Conclusion

The problems were of a significant difficulty level, yet the students found great joy in the challenge. By mastering both fundamental patterns and sophisticated formulas, the students significantly expanded their mathematical repertoire. The session concluded as a wonderful and highly engaging exploration of mathematical versatility.



- 1) A 200×3 rectangle is drawn on graph paper along the grid lines. How many grid squares will a diagonal of rectangle cross?
- 2) How many 10-digit numbers can be written using only the digits 1 and 2?
- 3) There are 10 mangoes in a tree. How many ways are there to pick several of them?
- 4) If we keep 2 rooks on a 3-dimensional $(8 \times 8 \times 8)$ chess board randomly, find probability such that 2 rooks are attacking each other.
- 5) If we keep 2 rooks on a 3-dimensional $(6 \times 8 \times 10)$ chess board randomly, find probability such that 2 rooks are attacking each other.
- 6) In a certain code, COMPUTER is written as PMOCRETU, how is HARDWARE written in that code?
- 7) If EARTH is written as FCUXM in a certain code. How is MOON written in that code?
- 8) In a certain code, HARYANA is written as 8197151, how is NASHIK written in that code?
- 9) In decimal (base 10) system: $(5346)_{10} = 5 \times (10)^3 + 3 \times (10)^2 + 4 \times (10)^1 + 6 \times (10)^0$
In octal (base 8) system: $(5346)_8 = 5 \times (8)^3 + 3 \times (8)^2 + 4 \times (8)^1 + 6 \times (8)^0 = (2790)_{10}$
Based on above knowledge, fill in the blanks
 - i) $(12340)_5 = _ \times (_)^4 + _ \times (_)^3 + _ \times (_)^2 + _ \times (_)^1 + _ \times (_)^0 = (_)_{10}$
 - ii) $(12340)_{10} = _ \times (_)^4 + _ \times (_)^3 + _ \times (_)^2 + _ \times (_)^1 + _ \times (_)^0 = (_)_5$
 - iii) $(102102120)_3 + (100110110101)_2 = (_)_5$
- 10) Find value of x : $(100)_x - (1)_x = (77)_x$
- 11) Find a 10-digit number where the first digit is how many zeros in the number, the second digit is how many 1s in the number etc. until the tenth digit which is how many 9s in the number.
- 12) When asked about his birthday, a man said: "The day before yesterday I was only 25 and next year I will turn 28." This is true only one day in a year - when was he born?
- 13) Find a number with its letters in alphabetical order. Example: "five" has "fiv" in alphabetical order, but not "e".
- 14) I am thinking of a 6-digit number. The sum of the digits is 43. And **only two** of the following three statements about the number are true:
 - (1) it's a square number,
 - (2) it's a cube number, and
 - (3) the number is under 500000.