FUNDA SPRING

Topics in Level 2 - Out Of The Box Thinking

Total number of Topics: 13
Net Lecture Duration: 20 hours

Syllabus

- **PASSENGER AND COMPARTMENT**

This is known as the famous box principle or pigeon-hole principle. This is used in all Mathematical Olympiad examinations under the head combinatorics as it tests the logical and analytical skills of contestants.
Outcomes: Logical skill development

- **SOCCER SCORE TABLE**

In any game, the results are put up in a table. Here we focus on soccer and its rules. The numbers under each head, like the number of games won, lost, points etc., have some inherent properties.
These are used to answer questions regarding the partially filled table with some game outcomes given. We can even answer questions regarding the game outcomes. This is similar to magic squares, sudoku, in that we fill cells with numbers based on the conditions of the game.
Outcomes: Logical analysis

- FROG JUMPING THEORY

Here we assume that a frog jumps in equal leaps on a number line. Assuming the starting point as 0 we can get numerous properties of multiples, the greatest common divisor of numbers.
If the starting point is a positive number, then we see other arithmetic sequences and properties thereof.
Outcomes: GCD, LCM and its properties

- **BASIC COUNTING**

Fundamental counting principles like addition and multiplication principles are introduced. Using ten simple tips, effective counting methods are introduced.

Problems using these principles in Arithmetic, Combinatorics, and other fields are discussed. Over and under-counting are discussed so that students can avoid these pitfalls.
Outcomes: Counting skills development.

- **STORY MATH**

Through storytelling, several mathematical concepts and techniques can be realised. From comparing fractions in numerous and different methods to a mean value theorem, stories can be designed to create joy and new dimensional thought about these facts.
Outcomes: Realising a lot of maths in real-life situations and its application in daily activities.

- **TABULATION WITH PROPER HEADER**

There are occasions where certain problems from elementary to higher levels can be solved through a mere tabulation but with an appropriately defined header.

This topic focuses on such a problem-solving process and exhibits the power of defining and tabulation.
Outcomes: Develops the skill of looking into alternate ways of solving other than the usual.

- **COWS AND BULLS**

This is a simple two-player number game where one player (say) A thinks of a number of a specified length and the other one (say B) needs to make guesses. For every guess made by B, A gives hints in the form of a number of cows and a number of bulls with a relevant meaning for the same, as defined in the game.

Player B has to think more logically as more hints are provided but should guess the complete number within a limited number of trials (mostly 8 trials). This is similar to the famous Master Mind game.
Outcomes: Emphasises the need for strategic thinking in situations of suspense and hints.

- **DISSECTION OF POLYGONS**

A Polygon can be dissected in many interesting manners based on its shape and dimension. This topic in Geometry is innovative. Given a polygon with certain characteristics, how to dissect it into a given number of objects, typically, triangles, special quadrilaterals etc.
The question may be to dissect it with the least number of cuts or the least number of objects. Many interesting problems give an insight into dissection patterns and also give an idea of induction-based dissection, nicely designed shapes, etc…
Outcomes: Understanding properties of polygons, learning visualization and developing two-dimensional spatial intuition.

- **SPORTS ALGEBRA**

An innovative way of developing algebraic identities using sports events.
Outcomes: Imbibes the synchronisation of thought process.

- **POSTBOX ALGEBRA**

An interesting way of realising algebra through posting letters in a post box.
Outcomes: Strong observations of binary patterns and coding in real life.

- **BASIC GEOMETRY**

Fundamental concepts like lines, rays, segments, angles, parallel lines, parallel postulates, and triangles are introduced. Invariance properties of the sum of the angles of polygons are presented and proved.

Three-dimensional figures and platonic solids and their properties are introduced. An approach to geometry problems using the fundamental six tips is introduced. Problems using these ideas are solved.
Outcomes: Basic Geometric skills, Solving simple problems in Geometry in multiple ways.

- **RULED NOTE-BOOK AND PERCENTAGE**

When percentages are used in profit and loss problems, we can solve these using pages of ruled notebooks. We start with 0% on a line and 100% is the Cost Price line. Here again, the use of algebra is avoided. A quick calculation is the result of this procedure.
Outcomes: Profit and Loss problems solutions; Skills required for competitive exams.

- **AREA AND PERIMETER**

The two important characteristics of any 2D-shaped closed figure are area and perimeter. This topic deals with a variety of interesting problems with these two characteristics.
Outcomes: Problem-solving skill enhancement.