



How the classes work

Every week you should *attend*:

- 2 Lecture Sessions (90 minutes long; conducted online or offline depending on your subscription)
- 1 Problem Solving cum Doubt Clearing Session (120 minutes long)

Every month you should *do*

- Monthly problem list (these are your monthly assignments)
- Monthly Long Test
- Read the Monthly Evaluation Report

If you have *doubts and/or questions*, then you may

- Attend Bridge Sessions
- Attend Doubt Clearing Classes

Cheenta Support:

- Support e-mail: helpdesk@cheenta.com
- Support phone: +91 79805 32630 (India); +1 414 204 5495 (Rest of the World)



Curriculum

Early Bird Curriculum

Number Theory I

This is the first course in elementary number theory:

- **NT.I.1** Primes, Divisibility
 - **NT.I.2** Arithmetic of Remainders
 - **NT.I.3** Bezout's Theorem and Euclidean Algorithm
 - **NT.I.4** Theory of congruence
 - **NT.I.5** Number Theoretic Functions
 - **NT.I.6** Theorems of Fermat, Euler, and Wilson
 - **NT.I.7** Pythagorean Triples
 - **NT.I.8** Chinese Remainder Theorem
-

Combinatorics I

This is the first course in combinatorics and elementary counting techniques:

- **Com.I.1** Multiplication and Addition rules
- **Com.I.2** Bijection Principles
- **Com.I.3** Combinatorial Coefficients
- **Com.I.4** Inclusion and Exclusion Principles
- **Com.I.5** Pigeon Hole Principle
- **Com.I.6** Recursions
- **Com.I.7** Shortest Route Problems



Algebra I

This is a first course in school algebra. (We assume that the student is familiar with algebraic expressions, and elementary algebraic identities)

- **Alg.I.1** Algebraic identities (Sophie Germain, Cube of three etc.)
 - **Alg.I.2** Mathematical Induction
 - **Alg.I.3** Binomial Theorem
 - **Alg.I.4** Linear Equations
 - **Alg.I.5** Quadratic Equation
 - **Alg.I.6** Remainder Theorem
 - **Alg.I.7** Theorems related to roots of an integer polynomial
-

Geometry I

- **Geo.I.1** Locus visualization
 - **Geo.I.2** Straight Lines
 - **Geo.I.3** Triangles
 - **Geo.I.4** Geometric Constructions
 - **Geo.I.5** Circles
-

Trigonometry I

- **Trig.I.1** Angle and rotation
- **Trig.I.2** Half arcs and Half chords - Genesis of trigonometric ratios
- **Trig.I.3** Elementary ratios and associated angles
- **Trig.I.4** Trigonometric identities
- **Trig.I.5** Geometry and trigonometry
- **Trig.I.6** Basic properties of Triangles



- **Trig.I.7** Compound Angles
 - **Trig.I.8** Multiple and Submultiple Angles
 - **Trig.I.9** Trigonometric Series
 - **Trig.I.10** Height and Distance
-

Inequality I

This first course in inequality must be preceded by a basic course in algebra.

- **Ineq.I.1** Geometric Inequalities
 - **Ineq.I.2** Arithmetic and Geometric Mean Inequality
 - **Ineq.I.3** Cauchy Schwarz Inequality
 - **Ineq.I.4** Titu's Lemma
-

Complex Number I

- **Complex.I.1** Geometry of Screw Similarity
 - **Complex.I.2** Field Properties of complex Number
 - **Complex.I.3** n th roots of unity and Primitive roots
 - **Complex.I.4** Basic applications to geometry
-



Intermediate Curriculum

Number Theory II

- **NT.II.1** Mobius Inversion Formula
 - **NT.II.2** Greatest Integer Function
 - **NT.II.3** Elementary Group Theory
 - **NT.II.4** Primitive roots and indices
 - **NT.II.5** Quadratic Reciprocity
 - **NT.II.6** Representation of Integers as sum of squares
 - **NT.II.7** Perfect Numbers
-

Combinatorics II

- **Com.II.1** Chu Shih Chieh' Identity (Hockey Stick)
 - **Com.II.2** Multinomial Coefficients
 - **Com.II.3** Advanced Pigeon Holes and Ramsay numbers
 - **Com.II.4** Catalan Numbers (and advanced bijection)
 - **Com.II.5** Stirling numbers of second kind
 - **Com.II.6** Generating functions
 - **Com.II.7** Non-linear recurrence
-

Algebra II

- **Alg.II.1** Elementary ring and field theory
 - **Alg.II.2** Eisenstein's criterion
-

Geometry II

- **Geo.II.1** Barycentric Coordinates



- **Geo.II.2** Miquel Point Configuration
 - **Geo.II.3** Translation
 - **Geo.II.4** Rotation
 - **Geo.II.5** Screw Similarity
-

Inequality II

- **Ineq.II.1** Schur's Inequality
 - **Ineq.II.2** Rearrangement Inequality
 - **Ineq.II.3** Jensen's Inequality
 - **Ineq.II.4** Bernoulli's Inequality and Power means
-

Complex Number II

- **Complex.II.1** Cyclotomic Polynomials
 - **Complex.II.2** Nine Point theorem and other geometric investigations using complex numbers
-



Advanced Curriculum

Number Theory III

- **NT.III.1** Thue's Theorem
 - **NT.III.2** Square Free Numbers
 - **NT.III.3** Diophantine Analysis of second and higher degrees
 - **NT.III.4** Arithmetic Progression whose terms are primes.
 - **NT.III.5** Trinomial of Euler
 - **NT.III.6** Scherk and Richart's Theorem
 - **NT.III.7** Amicable Numbers
 - **NT.III.8** Liouville function
 - **NT.III.9** Roots of polynomials and roots of congruences
 - **NT.III.10** Numeri Idonai
-

Combinatorics III

- **Com.III.1** Graph Theory
 - **Com.III.2** Invariance and Extremal Principles
 - **Com.III.3** Combinatorial Geometry
-

Algebra III

- **Alg.III.1** Polynomials
-

Geometry III

- **Geo.III.1** Inversive Geometry
 - **Geo.III.2** Advanced Application of complex numbers
 - **Geo.III.3** Projective Geometry
-

Inequality III

- **Ineq.III.1** Holder and Minkowski's inequality
-