



Physics Olympiad Program Level 3

Cheenta Academy for Olympiad & Research

cheenta.com

Since 2010

Passion for Mathematical Science & Research

This program is useful for Physics Olympiads like NSEP, InPhO, KVPY and IIT JEE styled entrances

Success Stories Since 2010



Aryan Kalia

Top 1% globally in American Math Competition,

Attended Math Olympiad Program and School Research Program at cheenta

Attended Student internship program at cheenta

Harvard University in 2022



Sambuddha Majumdar

Scotland Math Olympiad Awardee

Attended Math Olympiad Program at cheenta

Attended Student internship program at cheenta

University of Edinburgh



Anushka Aggarwal

Youngest Indian National Math Olympiad awardee, European Girls Math Olympiad awardee

Attended Math Olympiad Program at cheenta

Attended Student internship program at cheenta

MIT (Massachusetts Institute of Technology) in 2022



Akshaj Kadaveru

American Math Competition, AIME and USAJMO awardee

Attended Math Olympiad Program at cheenta

MIT (Massachusetts Institute of Technology)

Curriculum 96 week program, 17 modules

Mechanics

Module 1



Kinematics

3 Lessons



Motion in two and three dimensions



Projectile Motion and Uniform Circular Motion



Relative Motion

Module 2



Work, Power, Energy

3 Lessons



Definition of Work, Kinetic Energy and Potential Energy



Work Energy Theorem and Conservation of Mechanical Energy



Moment of Inertia and Rotational Kinetic Energy

Module 3



Newton's Laws of Motion

7 Lessons



Basics of Newton's laws of Motion



Calculations based on Free Body Diagram



Non-inertial frame and pseudo force



Conservation of Linear Momentum



Elastic and Inelastic Collisions



Circular Motion - Angular Momentum and Torque
(Basics)



Polar Coordinates - Centrifugal and Coriolis Force



Review & Evaluation

Module 4



Central Force

6 Lessons



Conservation Laws in a Central Force Problem



Examples of Central Force: Gravitation and Coulomb Force, Definition of Flux



Field Calculation and Gauss's Law



Gravitation - Field and Potential Energy due to Earth



Gravitation - Kepler's Laws and Motion of Orbiting Satellites, Orbital and Escape Speed



Review & Evaluation

Module 5



Rigid Body Dynamics

8 Lessons



Torque and Angular Motion



Moment of Inertia of a Rigid Body



Rotational Equilibrium



Combined Motion and Angular Momentum



Rotational Kinetic Energy and Conservation Laws



Rigid Body Collisions - I & II



Review & Evaluation

Module 6



Simple Harmonic Motion

10 Lessons



SHM as a Homogenous Linear Differential Equation



Linear Simple Harmonic Motion



SHM Equation from Free Body Diagram



SHM Equation from Energy Conservation



Superposition of multiple SHM



Damped Harmonic Motion



Approximations to SHM



Combinations of Spring Pulley Systems



Advanced Problems



Review & Evaluation

Module 7



Fluid Mechanics

3 Lessons



Pascal's Law and Archimedes' Principle



Steady and Turbulent Flow



Equation of Continuity and Bernoulli's Equation



Applications of Bernoulli's Equation

Module 8

5 Lessons



Surface Tension



Origin of Surface Tension



Surface Energy



Contact angle and Rise of Liquid in a Capillary Tube



Excess Pressure in a Liquid Drop or Bubble

Module 9



Properties of Bulk Matter

5 Lessons



Elasticity, Stress and Strain



Hook's Law and Module of Elasticity



Relation between Longitudinal Stress and Strain



Elastic Potential Energy of a Strained Body



Review & Evaluation

Module 10

4 Lessons



Viscosity



Viscosity and Poisseuilli's Equation



Stoke's Law and Terminal Velocity



Critical velocity and Renold's Number



Review & Evaluation

Curriculum

Non - Mechanics

Module 1



Heat and Thermodynamics

8 Lessons



Zeroth Law of Thermodynamics and Ideal Gas



Specific Heat and Calorimetry



First Law of Thermodynamics, Work done by a Gas and Heat



Thermodynamic Processes, Heat Engines



Second Law, Reversible and Irreversible Process



Entropy and Carnot Engine



Specific Heat Capacities of Gases



Review & Evaluation

Module 2



Heat Transfer

5 Lessons



Method of Heat Transfers



Conduction of Heat through Solids



Blackbody Radiation, Stefan's Law, Wein's Law



Newton's Law of Cooling



Review & Evaluation

Module 3

5 Lessons



Sound Waves



Sound Waves and Velocity in Different Mediums



Speed of Sound in Air, Intensity



Doppler Effect



Interference and Diffraction

Module 4



Wave Motion

6 Lessons



Motion of Wave Pulse on a String and Velocity of a Pulse



Power Transmitted By a Sinusoidal Wave Pulse



Interference and the Principle of Superposition



Reflection and Transmission of Waves



Standing Waves



Vibration of Strings for close and open ends



Transverse and Longitudinal Waves, Polarization of Waves



Review & Evaluation

Module 5



Electrostatics

7 Lessons



Coulomb's Law, Electric Field and Forces, Field Calculations



Electrostatic Potential and Equipotential Surface



Electric Dipole, Torque and Potential Energy of a Dipole in External Field



Conductors and Insulators, Electric Field inside a Conductor



Electric Flux and Gauss's Law



Review & Evaluation

Module 6



Electrodynamics

8 Lessons



Capacitance



Ohm's Law and Electric Current in Conductors,
Equivalent Resistance Calculations



Kirchoff's Laws



Magnetic Field



Magnetic Field due to a Current



Electromagnetic Induction



Alternating Currents and EM Waves



Review & Evaluation

Module 7



Ray Optics

4 Lessons



Reflection Laws, Spherical Mirrors



Refraction Laws, Thin Slab and Prism



Refraction at a Curved Surface



Review & Evaluation

and more...