School Connect Online

SCO INTERNATIONAL OLYMPIAD

CLASS 12 PHYSICS OLYMPIAD

Official Syllabus

A structured senior-secondary Physics syllabus for SCO International Physics Olympiad preparation and school implementation.

- aligned with Class 12 Physics progression and global expectations for scientific reasoning, modelling and evidence use
- useful for students, teachers, schools and parents for planning preparation, revision and assessment
- chapter-wise notes and learning outcomes support concept mastery, problem-solving and future STEM readiness

Electrostatics	Current Electricity	Magnetism	Induction	AC
EM Waves	Ray Optics	Wave Optics	Atoms & Nuclei	Electronics

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Official Syllabus

The SCO International Physics Olympiad Class 12 syllabus is designed for learners who are ready to connect mathematical modelling with physical interpretation. The syllabus emphasizes conceptual clarity, problem-solving discipline, practical reasoning, diagram interpretation and scientific communication.

Exam Name	SCO International Physics Olympiad
Class / Grade	Class 12
Exam Mode	Objective Type / MCQ
Duration	60 minutes
Number of Questions	50
Pedagogic Focus	Concept mastery, application, higher-order reasoning, interpretation of scientific data and experimental contexts

Chapter-wise Syllabus, Notes and Learning Outcomes

No.	Chapter Name	Small Notes for Learning	Learning Outcomes
1	Electrostatics	Charges, Coulomb's law, electric field, electric flux, Gauss's law, potential and capacitors.	Apply field, potential, flux and capacitance models to quantitative and conceptual problems.
2	Current Electricity	Drift velocity, Ohm's law, resistance, cells, networks, potentiometer and meter bridge ideas.	Analyse circuits using current, voltage, resistance, energy and measurement principles.
3	Moving Charges and Magnetism	Lorentz force, motion in magnetic field, Biot–Savart law, Ampere's law and force on current.	Solve charged-particle and current-carrying conductor problems using vector reasoning.
4	Magnetism and Matter	Magnetic dipoles, torque, earth's magnetic field and magnetic properties of materials.	Interpret magnetic field behaviour and material response in practical and experimental settings.
5	Electromagnetic Induction	Faraday's law, Lenz's law, motional emf, eddy currents, self and mutual inductance.	Predict induced emf/current and explain energy conservation in induction phenomena.
6	Alternating Current	AC voltage/current, rms values, reactance, impedance, resonance and power factor.	Use phasor and impedance reasoning to solve AC circuit and energy-transfer questions.
7	Electromagnetic Waves	Displacement current, EM spectrum, wave properties and applications.	Connect wave parameters, spectrum uses and physical meaning of electromagnetic radiation.
8	Ray Optics and Optical Instruments	Reflection, refraction, lenses, mirrors, prisms, human eye, microscope and telescope.	Apply ray diagrams, lens equations and optical-instrument concepts to real situations.

9	Wave Optics	Huygens principle, interference, Young's double-slit experiment, diffraction and polarization.	Analyse fringe patterns, phase difference, resolving power and wave nature of light.
10	Dual Nature of Radiation and Matter	Photoelectric effect, photon model, de Broglie wavelength and matter waves.	Explain quantum evidence and solve photon/matter-wave calculations.
11	Atoms	Bohr model, atomic spectra, energy levels and hydrogen atom transitions.	Interpret spectral lines and energy-level transitions using quantized models.
12	Nuclei	Nuclear structure, mass defect, binding energy, radioactivity, half-life and nuclear reactions.	Solve decay, binding-energy and nuclear-stability problems using evidence-based reasoning.
13	Semiconductor Electronics: Materials, Devices and Simple Circuits	Intrinsic/extrinsic semiconductors, p-n junction diode, Zener diode, transistor and logic gates.	Analyse basic semiconductor devices and logic circuits used in modern electronics.
14	Communication Systems	Modulation, bandwidth, propagation, antennas, transmission and noise in communication links.	Explain how signals are generated, transmitted, received and protected from distortion.

Recommended Preparation Roadmap

Stage	Student Action	Teacher / School Support
Foundation	Revise definitions, laws, formula meanings and units chapter-wise.	Provide concept maps, formula context and daily low-stakes checks.
Application	Solve mixed numerical and reasoning questions from each chapter.	Use stepwise solutions and discuss common misconceptions.
Integration	Practise cross-chapter sets linking electricity, magnetism, waves and optics.	Use case-study questions and peer explanation routines.
Olympiad Readiness	Attempt timed papers, review wrong answers and maintain an error notebook.	Run mock tests, feedback sessions and targeted revision clinics.

Assessment Blueprint

Section	Question Range	Primary Skill Tested
Core Concepts	Q1–Q20	Formula understanding, physical laws, conceptual clarity and unit reasoning.

Application/Data Reasoning	Q21–Q30	Multi-step calculation, scientific interpretation and real-world context.
Conceptual Reasoning	Q31–Q40	Cause-effect reasoning, comparison, model selection and misconception resistance.
Achievers Section	Q41–Q50	Higher-order numerical reasoning, integrated concepts and advanced Olympiad challenge.

Global Standard Alignment Snapshot

The syllabus was structured to support internationally recognizable physics learning outcomes: conceptual modelling, quantitative reasoning, experimental interpretation, use of evidence, and real-world application. It also prepares students for senior-secondary and early university STEM pathways without overloading the document with unnecessary theory.

Teacher Notes for Classroom Use

• Use short diagnostic quizzes before full-length practice so students know which chapters need attention.

• Ask students to explain why wrong options are wrong; this improves Olympiad accuracy more than memorizing formulas.

• For optics, electricity and magnetism, require labelled diagrams and unit checks during practice.

• For modern physics and semiconductor electronics, connect formula-based questions with evidence from experiments and applications.

• Encourage an error log with three columns: concept misunderstood, correct principle, and one similar practice question.

End of Syllabus