

PHYSICS (CLASSES XI-XII)

Physics (Class XI)

Learning Outcomes	Sources/ Resources	Suggested Activities (to be guided by teachers)
<p>The learner</p> <ul style="list-style-type: none"> – explains that the disciplinary approach of Physics is a transition from general sciences. – analyses the observations from the surroundings to appreciate the basic conceptual understanding of physics. – promotes process-skills, problem-solving abilities and applications of concepts/content in Physics, useful in real-life situations for making Physics learning more relevant, meaningful and interesting. – explains the fact that the theory and experiments go hand in hand in physics and help each other's progress. – explains domains of interest in physics: macroscopic (classical physics), mesoscopic and microscopic. Also, understands the scope and excitement of physics. – explains the scientific methods for developing the hypothesis, axioms, models and laws. – analyses through examples, the connection between physics, technology and society; and physics-related technological/industrial aspects to cope up with changing demand of society committed to the use of physics, technology and informatics. 	<p>NCERT/State Physics Textbook for Class XI; Part - I</p> <p>http://ncert.nic.in/textbook/textbook.htm?keph1=0-8</p> <p>Physics - PheT Simulations https://phet.colorado.edu/en/simulations/category/physics</p> <p>NCERT Official – YouTube https://www.youtube.com/channel/UC70s92hGjqLX6p7qY9BBrSA</p> <p>National Repository of Open Educational Resources (NROER) https://nroer.gov.in/home/e-library/Apply filter for Level (Higher Secondary) and Subject (Physics) to view the relevant e-resources.</p> <p><i>Laboratory Manual of Physics, Class XI, Published by the NCERT</i> http://www.ncert.nic.in/exemplar/labmanuals.html http://ncert.nic.in/ncerts/l/kelm101.pdf http://ncert.nic.in/ncerts/l/kelm102.pdf</p>	<p>WEEK 1</p> <p>Unit I Physical World and Measurement</p> <p>Chapter 1 Physical World Using the resources, learners may be asked to explore and learn about</p> <ol style="list-style-type: none"> 1. Science, Natural Science, Physics, Experiments and Theory in Physics and overlaps of Physics with other natural sciences 2. Scope and excitement of physics; Interrelationship of physics with technology, society and informatics. 3. Nature of fundamental forces; Unification of forces 4. Nature of physical laws <p>Project Learners may prepare life sketches of prominent physicists. Using the Internet and other reference books. A learner is envisaged as reading about the explanations and demonstrations of some classic experiments in physics.</p> <p>WEEK 2</p> <p>Chapter 2 Units and Measurements Using the resources, learners may be asked to explore and learn about</p>

<ul style="list-style-type: none"> - explains the fundamental forces in nature – gravitational, electromagnetic, strong and weak nuclear forces; and unification of forces. - explains the nature of fundamental laws such as conservation laws, etc. - uses international system of units (SI Units), symbols, nomenclature of physical quantities and formulations; SI base and derived quantities and their units. - derives methods of measurement of lengths – large as well as small; measurement of mass; and measurement of time. - explains the range of lengths, masses and time intervals. - explains the need of accuracy, precision, errors and uncertainties in measurement; and classify errors. - explains the rules for arithmetic operations with significant figures; rounding off the digits. - derives dimensional formulae and dimensional equations using the dimensions of physical quantities. - applies understanding of dimensional analysis in checking the dimensional consistency of relations and deducing the relations between different physical quantities. - gets acquainted with the Greek alphabet; Common SI prefixes and symbols for multiples and sub-multiples; Important constants; Conversion factors; Mathematical formulae; SI derived units 	<p>Bibliography of physics books for additional reading on the topics covered (reference: <i>Physics, Textbook for Class XI, Part II</i>, p. 405 – 406, Published by the NCERT http://ncert.nic.in/textbook/textbook.htm?keph2=an-7</p> <p>A list of 14 websites for downloading textbooks free of charge can be obtained at https://www.ereader-palace.com/14-sites-download-textbooks-free/</p> <p>Another website for downloading books free of cost is www.pdfdrive.com</p> <p>Textbook contains QR codes and one can access e-resources linked to those QR codes by following step by step guide given at the beginning of textbook.</p>	<ol style="list-style-type: none"> 1. Need of standard units; base and derived units; different unit systems and relationship between corresponding units of different physical quantities; SI system of units; SI base quantities and units (with their definitions as per new IAPAP rules). 2. Measurement of length – large distances (parallax methods) and very small distances (indirect methods); Measurement of mass and time intervals; Range and orders of lengths, masses, and time intervals. 3. Accuracy, precision, certainty and errors in measurements of physical quantities; Systematic, random and least count errors; Absolute, relative and percentage errors; Combination of errors. 4. Significant figures; Rules for arithmetic operations with significant figures; Rounding off digits in measurements (or calculations); Determining the uncertainties in expressing results. 5. Dimensions of physical quantities; Dimensional formulae and dimensional equations; Applications of dimensional analysis. 6. Appendices: The Greek alphabet; Common SI prefixes and symbols for multiples and sub-multiples; Important constants; Conversion factors; SI derived units (expressed in SI base units); SI derived units with special names;
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<p>(expressed in SI base units); SI derived units with special names; Guidelines for using symbols for physical quantities, chemical elements and nuclides; Guidelines for using symbols for SI units etc.; Dimensional formulae of physical quantities.</p> <ul style="list-style-type: none"> - explains motion as change in position with time. - differentiates between distance and displacement; speed and velocity; rectilinear and curvilinear motions; kinematics and dynamics; inertial and non-inertial frames of references; average, relative, and instantaneous velocity and speed etc. - derives (graphically) kinematic equations for uniformly accelerated motion - explains elementary calculus (both differential and integral) that is required to describe motion. - plans and conducts investigations and experiments to arrive at and verify the equations of motion of bodies under uniformly accelerated motions. - handles tools and laboratory apparatus properly; measures physical quantities using appropriate apparatus, instruments, and devices, such as, scales, balances, watches, etc. (optional) - analyses and interprets data, graphs, and figures, and draws conclusion about the state of motion, speed (and velocity), 		<p>Guidelines for using symbols for physical quantities, chemical elements and nuclides; Guidelines for using symbols for SI units etc.; Dimensional formulae of physical quantities.</p> <p>7. Revision, doubt clearing and practice solving problems</p> <p>Project</p> <p>Learners may be given the suggestion to measure astronomical distances, such as, the distance between earth and an identified star etc., using the parallax method.</p> <p>Learners may be advised to look at the BIPM/IAPAP website to prepare a chart on the definitions of SI base units.</p> <p>Using vernier callipers/screw gauze/spherometer learners may perform activities and experiments to measure small lengths and radius of curvature, etc. (optional)</p> <p>WEEKS 3 AND 4</p> <p>Unit II Kinematics</p> <p>Chapter 2 Motion in a Straight Line</p> <p>Learners may be asked to make observations about their surroundings and use the following resources to learn about:</p> <ol style="list-style-type: none"> 1. State of motion; Frames of reference; Position,
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<p>acceleration (uniform and non-uniform), distances (and displacements) covered, etc.</p> <p>Learning Outcomes cut across different themes</p> <p>The learner</p> <ul style="list-style-type: none"> - communicates the findings and conclusions effectively. - applies concepts of physics in daily life while making decisions and solving problems. - takes initiatives to learn about the newer research, discoveries and inventions in Physics. - realises and appreciates the interface of Physics with other disciplines, such as with Chemistry as various materials. - develops positive scientific attitude, and appreciates the role and impact of Physics and technology towards the improvement of quality of life and human welfare - exhibits values of honesty, objectivity, rational thinking, and freedom from myth and superstitious beliefs while taking decisions, respect for life, etc. 		<p>path length and displacement</p> <ol style="list-style-type: none"> 2. Elements of Calculus (Appendix 3.1) 3. Mathematical Formulae (Appendix A5 placed at the end of textbook) 4. Average velocity and average speed 5. Instantaneous velocity and instantaneous speed 6. Acceleration; Solving problems; and discussion on learners' doubts 7. Kinematic equations for uniformly accelerated motion – graphical method; 8. Free fall; Reaction time; and Relative velocity 9. Solving problems <p>Project</p> <p>Ask children to calculate their own reaction time.</p>
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