

Physics

Year 9

(105/87 hrs, 3/2.5 hrs per week, reserve – 4 hrs)

Table of contents	
1.	<p>Magnetic phenomena</p> <p>Magnetic phenomena. Oersted's law. Magnetic field. Magnetic field of an energized conductor</p> <p>Magnetic field induction. Ampere force. Magnetic features of substances. Ampere's hypothesis.</p> <p>Constant magnets, correlation of magnets. Magnetic field of the Earth.</p> <p>Solenoids. Electric engines and loudspeakers. Electric measuring devices.</p> <p>Electromagnetic induction. Faraday's experiments.</p> <p>Induction current generators. Industrial electric energy sources.</p>
2	<p>Light phenomena</p> <p>Light phenomena. Speed of light. Ray of light. Law of direct spreading of light. Sun and moon eclipse.</p> <p>Light reflection. Law of light reflection.</p> <p>Law of light refraction.</p> <p>Dispersion of white light. Creation of colors</p> <p>Lenses. Optical force and lens focal length.</p> <p>Simplest optical devices. Glasses. Eye. Sight and vision. Vision deficiencies and correction.</p>
3.	<p>Mechanic and electromagnetic waves</p> <p>Emergence and spreading of mechanic waves. Sound waves. Speed of sound spreading, length and frequency of a sound wave. Sound volume and tone highness.</p> <p>Infra- and ultrasounds.</p> <p>Electromagnetic field and electromagnetic waves. Speed of spreading, length and frequency of an electromagnetic wave. Scale of electromagnetic waves.</p> <p>Wireless communication.</p>
4.	<p>Physics of an atom and atom nucleus. Physical bases of nuclear energy sector</p> <p>Modern model of an atom. Rutherford's experiments. Proton-neutron atom nucleus model. Nuclear powers. Isotopes. Using isotopes.</p> <p>Radioactivity. Radioactive emission, their physical nature and features. Radionuclide half-life.</p> <p>Natural radioactive level. Dosage meters. Biological action of radioactive emission.</p> <p>Heavy nucleus splitting. Nuclear reactor. Atomic energy of Ukraine. Environmental problems of atomic energy.</p> <p>Thermonuclear fusions. Solar energy</p>
5.	<p>Movement and interaction. Laws of conservation</p> <p>Uniform acceleration. Acceleration. Graphs of uniform straight movement acceleration.</p> <p>Inertial frames of reference. Newton's laws.</p>



	<p>Law of universal gravity. Free fall acceleration. Body movement under the force of gravity. Body movement under several forces (in vertical and horizontal directions and on an incline plane).</p> <p>Interaction between bodies. Impulse. Impulse law. Reactive movement. Physical grounds of missile devices.</p> <p>Using the laws of conservation of energy and impulse law in mechanical phenomena.</p> <p>Fundamental relations in nature. Fundamental manner of laws of conservation of energy in nature.</p>
6.	<p>Physics and ecology</p> <p>Physics and issues of vital activity security. Physical bases of responsible nature use and energy conservation. Alternative sources of energy.</p>

Expected results

Pupil:

- understands the mechanisms of magnetic interaction, electromagnetic induction, magnetic levitation, the materiality of a magnetic field, and Ampere's law;
- explains the experiments of Oersted, Faraday, the nature of solenoid, electric engine, electric measuring devices; knows the signs of the presence of magnetic field of Earth.
- uses the Ampere force formula in solving different types of tasks;
- defines the directions of magnetic field induction, the Ampere force, and induction current;
- assesses the meaning of the magnetic field of the Earth in life processes of organisms;
- understands the concept of a light beam, pointlight, and thin lens;
- uses the laws of rectilinear propagation, reflection and deflection, and thin lens formula in solving the tasks of different types and during the completion of laboratory works;
- explains the reasons for sun and moon eclipse;
- measures the focal length and defines the optical force of a lens.
- understands the concept of a wave process, conditions of creating mechanic and electromagnetic waves;
- knows the physical bases of modern wireless communication devices;
- uses the formulas of interrelation of length, frequency, and speed of wave spreading, and speed of wave spreading to solve different types of tasks;
- knows the concepts of radioactivity, isotope, radionuclide half-life and radioactivity, nuclear, and thermonuclear fusions;
- understands the mechanism of chain nuclear reactions; the mechanism of a nuclear reactor; and mechanisms of nuclear processes of the Sun and the stars;
- knows about the impact of radioactive radiation on living organisms.
- knows the features and characteristics of straight movement acceleration; the concept of inertial reference unit; acceleration, body impulse, free fall acceleration; first, second, and third Newton's laws, the law of universal gravity, and the impulse law

Educational programs in use for teaching Ukrainian children



STATE SERVICE
OF EDUCATION
QUALITY
OF UKRAINE

- uses the laws of conservation to explain the physical phenomena and processes;
- knows the physical parameters of environment pollution (mechanic, noise, electromagnetic, and radiation); mechanisms of impact of solar radiation on the life of organisms; mechanisms of ionization impact of electromagnetic smog and radioactive radiation on the organisms;
- knows the physical and technical bases of pollution preventing and eliminating devices;
- knows the bases of safe energy production; and
- realizes the importance of ecological behavior.