**The curriculum-thematic plan of the course**

**Учебно-тематический план курса**

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| **№** | **Theme** | **What is being studied** | **The student will** | **Number of hours** | **Date** |
| **Heat phenomena** | | | | | |
| 1 | Motion of atoms and molecules. | Brownian motion. Diffusion. Molecular-kinetic theory. | * Describe experimental proofs and show examples of Molecular-Kinetic Theory. | 1 |  |
| 2 | Temperature and internal energy. | Temperature. Temperature scales. Internal energy. | * Describe usage of thermal expansion in temperature measurement; * Use different temperature scales (Kelvin, Celsius); * Describe ways of changing of internal energy. | 1 |  |
| 3 | Heat transfer. Application of heat transfer. | Heat transfer. Conduction. Convection. Radiotion. | * Compare different types of heat transfer; * Tell examples of heat transfer in daily life and industry; * Tell examples of adaptation of living organisms to different temperatures. | 1 |  |
| 4 | Specific heat capacity. | Mass of the substance. Type of the substance. Change in the temperature of the substance. | * Determine heat lost and heat given during heat transfer; * Explain physical meaning of specific heat capacity. | 1 |  |
| 5 | Heat of combustion. | Heat of combustion. Formula of heat of combustion. | Apply formula of heat of combustion to solve problems. | 1 |  |
| 6 | Heat exchange. | Heat exchange. Heat balance. | Apply equation of heat balance to solve problems. | 1 |  |
| **States of matter** | | | | | |
| 7 | Melting and freezing. | Melting. Specific latent of fusion. Freezing. Formula of freezing/ melting. | * Use Molecular-Kinetic Theory to describe melting and freezing; * Apply formula of freezing/ melting for problem solving. | 1 |  |
| 8 | Evaporation and condensation. | Evaporation. Specific latent heat of evaporation. Condensation. | * Use Molecular-Kinetic Theory to describe boiling and condensation; | 1 |  |
| 9 | Graphical analysis. | Temperature-time graph of melting and freezing; boiling and condensation. | * Analyze temperature-time graph of melting and freezing; * Analyse temperature-time graph of boiling and condensation. | 1 |  |
| 10 | Humidity. | Humidity. Humidity and Temperature. Boiling and Air pressure. | * Determine amount of heat during boiling; * Explain dependence of boiling point on external pressure. | 1 |  |
| **Thermodynamics** | | | | | |
| 11 | First law of thermodynamics. | First law of thermodynamics. | * Explain the first law of thermodynamics. | 1 |  |
| 12 | Heat engines. | Heat engines. | * Describe transformations of energy in heat engines; * Explain working principles internal combustion engine and steam turbine. | 1 |  |
| 13 | Efficiency of heat engine. | Efficiency of heat engine. The formula of efficiency. | * Determine efficiency of heat engine; * Propose methods to increase efficiency of heat engines. | 1 |  |
| 14 | Ecology and energy. | Fossil fuels. Biomass fuels. Nuclear fuels. Water power. Sun and wind power. | * Estimate the effect of heat engines on ecology of environment. | 1 |  |
| **Electrostatics** | | | | | |
| 15 | Electric charge. | Electric charge. Charging methods. Positive and negative effects of charging. | * Characterize electric charge; * Explain charging by friction and induction; * Give examples of positive and negative effects of charging; * Explain charging by rubbing, induction and contact. | 1 |  |
| 16 | Conservation of electric charge.. | Conservation of electric charge. Interaction between charges. Coulomb’s law. | * Explain law of conservation of charge; * Apply Coulomb’s law for problem solving. | 1 |  |
| 17 | Electric field. Coulomb’s law | Electric field. | * Explain physical meaning of “electric field” and determine its dynamics characteristics; * Calculate force applied on charge by electric field; * Show electric field by using electric field lines. | 1 |  |
| 18 | Electric potential. Potential difference. | Potential. Potential difference. | * Explain physical meaning of electric potential and potential difference. | 1 |  |
| 19 | Capacitance and capacitors. | Electric capacitance. Capacitors. Parallel plate capacitors. | * Describe structure of capacitor and its function. | 1 |  |
| **Electric current** | | | | | |
| 20 | Electric current. | Electric current. Source of current. Conductors and insulators. | * Explain conditions for production of electric current. | 1 |  |
| 21 | Electric circuit. Voltage. | Electric elements. Electric circuit. Voltage. | * Use schematical drawings of elements of electric circuit to draw electric circuit; * Explain physical meaning of voltage and its unit of measurement. | 1 |  |
| 22 | Electrical resistance. | Electrical resistance. | * Apply Ohm’s law for part of electric circuit for problem solving. | 1 |  |
| 23 | Resistivity. | Length. Area. Resistivity. Resistance and temperature. | * Explain physical meaning of electric resistance and its unit of measurement; * Apply formula of resistivity for problem solving. | 1 |  |
| 24 | Parallel and series connections of resistors. | Series combination.  Parallel combination. | * Design complex electric circuits (that have series and parallel combination of resistors) by using Ohm’s law. | 1 |  |
| 25 | Electrical energy and power. | Electrical energy and power. Joule- Lenz law. | * Apply formulas of electric power and electric work for problem solving. | 1 |  |
| **Electromagnetism** | | | | | |
| 26 | Magnetic field. | Magnetic field lines. Electric current and magnetic field. Electromagnet. Magnetic field in nature. | * Explain properties of magnetic field; * Determine direction of magnetic field of straight wire and solenoid; * Describe magnetic phenomena in nature. | 1 |  |
| 27 | Electric motors. Electricity production. | Electric motors. Electromagnetic induction. Electricity production. | * Describe the effect of the magnetic field on current carrying wire; * Explain the structure and working principles of an electromotor and electric devices; * Describe electromagnetic induction; * Give examples of electricity production in the world and in Kazakhstan. | 1 |  |
| **Optics** | | | | | |
| 28 | Lunar and solar eclipse. | Lunar and solar eclipse. | * Graphically represent solar and lunar eclipses. | 1 |  |
| 29 | Reflection. | Reflection. The rules for reflection of light. Image formation in a plane mirror. | * Experimentally determine relationship between the angle of incidence and the angle of reflection; * Explain and give examples of regular and diffuse reflection; * Plot image in plane mirror and list its properties. | 1 |  |
| 30 | Refraction. | Refraction. The law of refraction. | * Apply the law of refraction for problem solving; * Draw a ray diagram in rectangular prism. | 1 |  |
| 31 | Converging lens. | Converging lens. Image formation by a converging lens. Magnification of image. | * Apply the formula of a thin lens for problem solving; * Apply the formula of a magnification of lense for problem solving; * Draw a ray diagram of the image in a thin lense and list properties of the image. | 1 |  |
| 32 | Diverging lens. | Diverging lens. Image formation by a diverging lens. Magnification of image. | * Apply the formula of a thin lense for problem solving; * Draw a ray diagram of the image in a thin lense and list properties of the image. | 1 |  |
| 33 | Human eye and optical devices. | Human eye. Normal vision and eye defects. | * Describe the correction of myopia and hyperopia. | 1 |  |
| 34 | What you need to remember? |  | * Describe and explain physical phenomena; * Apply theoretical knowledge in solving life problems in various fields of activity; * Establish relationships between physical quantities. | 1 |  |
|  | **Total** |  |  | **34** |  |