Problems in Organizing Independent Study Activities in Physics Classes

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Abstract: Physics is an intersection of all disciplines, closely intertwined with other disciplines. It is no coincidence that an American scientist says that everything has physics. Therefore, today the issue of perfect teaching of this subject not only in schools but also in higher education institutions is of great importance. In this article, the author describes in detail the methodology and importance of teaching world science, as well as the material and spiritual role of physics for students.

Keywords: Physics, methodology, Higher education, quality of education, induction, deduction, student, technique.

Relevance of the topic. Development of physics education in the world's leading higher education and research institutions, widespread use of induction and deduction methods in physics teaching, implementation and improvement of international assessment programs, modernization of educational content on the basis of integrated approach to physics teaching. Research is being carried out in the country on the introduction of innovative information technology. At the same time, special attention is paid to research work on the development of creative thinking skills of students in the study of physics, improving their professional competence, the introduction of information technology in teaching physics, ensuring the harmony of theory and practice in teaching, is given.

The need for creative and competent professionals in society is increasing and increasing the importance of personal development.

The purpose of the study. The technique is to develop scientifically based proposals and recommendations to improve the methodological framework of a competency-based approach to the training of future technical specialists in higher education institutions, to improve teaching methods.

Particular attention should be paid to the selection of interesting topics in order to develop students' thinking skills in the development of independent learning activities, to increase their interest in the lesson. The selected issues should be systematized and targeted. Therefore, it is important to pay special attention to the choice of topics and chapters, aimed at developing the ability to think independently. The content of experimental and graphic problems is based on the goals and objectives of teaching physics in high school, compliance with the requirements of the SST, the problem is clear and realistic, and the student has a clear scientific knowledge and practical skills need

Experiments in solving experimental problems should be set in accordance with all the conditions of the school demonstration experiment. Make sure you keep track of the miles you have and if and when they expire. The experiment should be supervised by a teacher. Here is an example of a demonstration experimental problem.

The proton passes through a potential difference of 1 kV, acquires a velocity and falls into a
homogeneous magnetic field with an induction of 0.2 T perpendicular to the induction lines.

Determine the radius of the circle in which the proton moves and its period of rotation.

\[ U = 1000 \, \text{B-acceleration potential difference}; \quad B = 0.2 \, \text{T-magnetic field induction}; \]

\[ v = \text{from the angle table between the vectors} \]

\[ m_p = 1.67 \times 10^{-27} \, \text{kg-the mass of the proton}; q = 1.6 \times 10^{-19} \, \text{C-proton charge}. \]

Need to find: \[ r - \text{circle radius}; \quad T - \text{the period of rotation of the proton}. \]

Solution. A moving electric charge, in our case a proton, is affected by the Lawrence force in a magnetic field: \[ \Phi = B\mathbf{q} \]

Here \( \alpha - \hat{\mathbf{B}} \) and \( \mathbf{v} \) the angle between the vectors. If we consider \( \alpha = 90^\circ \) and \( \mathbf{v} \) because the vectors are always perpendicular to the standing plane, they do not work, i.e., they do not change the kinetic energy of the moving charges (only the direction of velocity changes under the influence of this force. Therefore, we can write the following).

\[ Bv = \frac{m_p v^2}{r}, \quad \text{from this } r = \frac{m_p v}{Bq}. \]

To find the velocity of a proton, we use the law of conservation of energy (electric field strength \( U \) is equal to the kinetic energy obtained by the proton: \( qU = \frac{m_p v^2}{2} \), from this

\[ v = \sqrt{\frac{2qU}{m_p}}; \quad v = \sqrt{\frac{2 \times 10^3 \times 10^{10}}{1.67 \times 10^{-27}}} = 4.4 \times 10^5 \, \text{m/s}. \]

Finding the radius of the circle:

Knowing the velocity of a proton and its orbit, we determine its period:

\[ T = \frac{2\pi r}{v}; \quad T = \frac{2 \times 3.14 \times 0.023}{4.4 \times 10^5} \approx 0.3 \, \text{ns}. \]

answer. The proton moves in a circle with a radius of 0.023 m and a rotation period of about 0.3 µs.

Problems in which the object of study consists of graphs of correlations of physical quantities are called graphical problems.

In some cases, these graphs are given in terms of the problem, and in some cases, they need to be summarized.

When solving graphic problems:

students should be able to “read” graphs and develop skills and abilities to create simple graphs.

increasing the complexity of working with graphs, encouraging students to find quantitative relationships between quantities until they can construct equations.

The steps for solving graphic problems are as follows:

1) if a graph of the relationships between the quantities is given, then it is necessary to explain it, to study the nature of the relationship in each section; 2) using a scale to find the quantities (values on the abscissa and ordinate axes) sought from the graph; 3) If a link graph is not provided, then a graph is created based on the values obtained from special tables or the condition of the problem. To do this, draw the coordinate axes, select a certain scale, create
tables, and then place the corresponding points on the ordinates and abscissae of the plane with the coordinate axes. By combining these points, a graph of the relationship between the physical quantities is made, and then studied in the order described above.

As an example, consider the following issue.

Students solve problems independently:

- strengthens theoretical knowledge;
- the ability to think independently is formed and developed;
- studies the relationships between physical quantities;
- consciously master the laws of physics;
- Ability to create graphs depending on the situation;
- learns to write down physical quantities based on graphs.

**Conclusion.** At the Department of Physics and its teaching methods, information and technical support of physics education, activation of didactic, interactive tools, use of modular technology, communicative, self-development of basic competencies as a person, problem solving, increasing the effectiveness of lessons. Ilanildi. Improving the effectiveness of the transition to physics will serve to increase the knowledge and competence of methodological training of future technical specialists in higher education institutions.

**References:**