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PROBLEM SOLVING METHOD IN PHYSICS IN GENERAL SECONDARY SCHOOLS

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Annotation: This article provides a comprehensive study of students problem-solving in physics, which aims to develop students' problem-solving skills to solve the problem. Developed methods for solving graphical problems, experimental problems, arithmetic and algebraic problems, non-standard problems.

Keywords: graphical problems, experimental problems, arithmetic method, algebraic method, graphical method, geometric method.

Based on the design of educational processes, the correct definition of the content of education, the purpose of education, the expected outcome, the correct choice of teaching methods, forms and tools, the assessment of students' knowledge, skills and abilities it is advisable to develop the criteria in advance, implement them correctly within the time allotted to the training, and pay attention to their compatibility with each other. Non-standard problems are more difficult for students, especially when the problem-solving algorithm is unclear. In general, any particular issue can be non-standard. If he brings up a few similar issues, it becomes the standard.

Issues related to technical, industrial or agricultural production, transportation and communications materials are called polytechnic issues. Such issues are of great interest to physics students.

Interesting issues are also common. They are an unusual paradox or a revival of interesting facts in the classroom, engaging students in physics. Y.I. Perelman, M.I. Ilin, B. F. Bilimovich There are many such issues in textbooks.

Physics problems can also be classified according to their level of complexity. Non-complex issues, such as analyzing the meaning of formulas, choosing a system of units, and finding a physical quantity from ready-made formulas, are usually solved in the process of studying the topic.

More complex issues include problematic situations and elements of innovation. These are just some of the goal setting shareware that you can use. They are given special time to solve them, including separate lessons on problem solving, and given homework.

There is no clear boundary between these types of issues. As the issues become more and more complicated, we are faced with issues that are often in life or in technology, with only problems and no magnitude. Methodists call such issues "creative." Creative issues can be qualitative, computational, or experimental.

In terms of the nature and methods of research, the issues are divided into qualitative and quantitative issues.

Qualitative issues are those in which only a qualitative relationship is identified between physical quantities. Usually calculations are not performed when solving such problems. Sometimes these issues are called differently in the methodological literature: question questions, logical questions, quality questions.

Quality issues are given primarily to reinforce the material being studied. There are also branches of physics in which quality is at the heart. The hydrodynamics department is one of them. Quality is also an important factor in determining the level of mastery of a material. Quality issues allow you to quickly determine the physical nature of the issue at hand.

The scheme for solving quality problems is as follows:

- read the terms of the problem, identify all the terms in the problem;
- analyze the conditions of the problem, identify physical phenomena, if necessary, draw a scheme or diagram;
- to determine whether the result corresponds to its physical meaning;

Quality questions are sometimes called quizzes or quizzes. They are usually solved according to a single physical law, which makes it much easier to draw a series of logical conclusions.

An issue that combines a few simple issues is a complex issue of quality. To solve them, we have to draw a number of logical conclusions, analyze a number of physical laws and regulations. We start by solving simpler problems.

The laws of dynamics apply to each specific case to solve these problems. In solving these problems, students must first determine the condition of the problem, understand what it is about. First, it is necessary to determine what physical phenomenon is observed in a given situation. Obviously, in this case, an inertial phenomenon is observed, so the reasoning should be based on the law that explains the phenomenon of inertia. This law is Newton's first law of inertia, and students repeat it in problem solving.

Thus, for example, a person who stumbles stops because his foot is caught in an obstacle, and the rest of the body moves forward by inertia, so it is concluded that the person falls forward when he stumbles. Problems that use a certain amount of experimentation are called experimental problems. It describes the experimental process and its results are determined on the basis of the quantities obtained in the experiment.

Methods of solving computational problems depend on their complexity, the readiness of students, the goals set by the teacher, and many other factors. The methods of solving computational problems are divided into arithmetic, algebraic, geometric and graphical methods, depending on the mathematical apparatus used. The order in which different types of problems are solved varies and depends on many conditions. In some cases, experimental problems are solved first, in other cases, computational problems are solved first, and so on. However, in many cases it is advisable to first solve qualitative or experimental problems, and then solve computational and graphical problems to determine the physical nature of the problem.

Logical problems are simple problems that are often solved by thinking about a single event or law and using one or two formulas.

Complex or creative problems are more complex problems that require a number of laws and a number of formulas to solve. In practice, it is recommended to gradually move from simple logic to complex problems.

Graphical problems - their condition is given graphically, or the analysis of the condition provides the information needed to solve it on a graphical basis, and the problem is solved on the basis of a graph, or the desired size is determined.

Experimental Problems - An experiment is used to find the quantities given in them or to determine the correctness of a problem. Another definition is a quantitative (computational) problem or problem that is used in an experiment to solve experimental problems.

As the content and complexity of physical problems vary, so do the methods used to solve them. Depending on the nature of the mathematical methods used, the solution of quantitative problems can be divided into the following methods: arithmetic, algebraic, geometric, graphical.

1. The arithmetic method is a problem-solving problem based on formulas with logical reasoning. In this way, the problems are solved by answering a series of questions in the first stage of teaching physics.

2. Algebraic Method - most complex problems are solved by the algebraic method. This method is divided into two methods: analytical and synthetic.

In analytical methods, a complex problem is solved by dividing it into a series of simple problems. The solution begins with choosing a law that directly answers the question at hand. The formula is written, and based on its analysis, the missing physical quantities are found.

In the synthetic method, the solution to a problem begins with a quantity that can be found directly from the problem condition, rather than with the required quantity. The solution is carried out step by step until the desired size is entered into the final formula, that is, in this method, the intermediate relationships between the previously given physical quantities are determined.

Graphic method. The solution in this method is based on a graph of a linear connection or connection, and the required size is found according to geometric rules.

Geometric method. In this method, a vector graph or the required connection graphs are drawn, and the amount of quantities to be found is found directly on the straight line. This method is mainly used to solve a number of problems related to mechanics. factor.

However, the process of solving problems in physics requires students to provide theoretical and practical knowledge, their integration. While this is less common in theoretical problems, it is more common in technical problems.

Technical issues include the following conditionally grouped issues:

1. Issues related to household and household appliances.
2. Elementary machines: block, lever, gear, friction and belt transmission issues.
3. Issues related to the element of mechanical engineering.
4. Energy issues.
5. Issues related to transport vehicles.
6. Material science issues.
7. Issues related to production equipment.
8. Issues related to engines and generators.
9. Optical devices and issues related to their structure.
10. Issues of electrolysis and chemical reactions.
11. Environmental issues.

The problem-solving process and its analysis are different. There are a number of ideas and opinions on the problem-solving algorithm. However, they do not fully describe the choice of a problem in physics, its solution, or the analysis of a solution. Therefore, we recommend an algorithm for the process of selecting, solving, and analyzing a problem from the physics shown in Figure 1. It describes the process from physics to the choice of a problem to the study of its solution. The difference between

this problem-solving algorithm and existing algorithms is that it more accurately describes the purposeful selection of a problem, the expression of the problem condition, the physical conditions necessary to solve it, the methods of solution, and the process of problem solving and justification.

It also outlines the theoretical knowledge-based steps of problem solving, while the remaining steps (conditionally separated) are practical knowledge-based processes.

Thus, both theoretical and practical knowledge are required to solve the problem, and it is possible to solve the problem only if they are inextricably linked.

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