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GENERAL CONSIDERATIONS ON THE METHODOLOGY FOR SOLVING PROBLEMS IN PHYSICS

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Annotation

Solving physical problems is very important in the process of teaching physics. Problem-solving contributes to a deeper study of physics, the consolidation of theoretical knowledge, and the development of students' creative thinking. This article shares the methods used to solve problems in the field of mechanics and provides comments.

Methods for solving problems depend on the simplicity or complexity of the tasks, the goal set by the teacher, the level of knowledge of students, and many other reasons. Methods for solving problems on the application of mathematical actions in the process of solving problems are divided into the following types:

1. Arithmetic method. 3. Geometric method.

2. Algebraic method. 4. Graphical method.

According to the nature of the logical actions used in the process of solving problems, they are divided into analytical, synthetic or analytic-synthetic methods.

General considerations on the methodology for solving problems in physics. Depending on the content, the questions are conditionally related to the sections of mechanics, molecular physics, electricity and magnetism and other sections of physics. Analyzing the literature on the methodology for solving most problems and from our own experience, we came to the conclusion that there are common aspects of solving problems related to all sections course of physics, and specific aspects of the methodology for solving problems related to each of the main topics. Below we will focus on the general aspects of the methodology for solving problems in physics:

1. As you know, the content of each physical issue is a particular manifestation of physical phenomena, laws. Therefore, in order to solve the simple or complex question of which branch of physics it belongs to, it will be necessary to deeply study the theory to which it belongs. Without knowing theoretical conclusions, formulas expressing actions, it is impossible to solve the problem.
2. Solving a question begins with carefully reading it several times and understanding its content. Immediately after reading the terms of the question, you should not focus on the desired value and try to quickly find it. On the contrary, it is necessary to thoroughly understand the physical

phenomenon reflected in matter, to recall the physical laws and formulas underlying this phenomenon. If you need to find a physical quantity, as well as calculate a chain or make an image, you need to clarify what quantities and conditions are given in the question. Data about the problem is recorded in the order provided for by its condition. If in the condition of the problem the quantities are given in different systems of units, then they must be reduced to the SI system.

3. If drawings or diagrams are given in the question, they must be carefully studied and copied correctly. If neither a picture nor a chain is given in the question, then according to the condition of the problem, we must present the physical process and draw a drawing or diagram that fully reflects the essence of the question.

Another common feature that applies to all branches of physics is that after performing successive steps specific to each section, the result is analyzed and verified as correct. After making sure that the result is correct, it is necessary to make calculations. When performing calculations, it is necessary to use the training software as much as possible, which saves time.

In the process of physical education, the solution of physical problems occupies a very important place. If we take into account that this process is a relatively effective form of in-depth study of physics, consolidation of theoretical data and development of students' creative thinking, then we see that this process is by no means simple.

An optional problem is a problem whose solution is a solution to a problem. When great scientific discoveries come to the surface, the solution of huge problems, the solution of an arbitrary task, constitutes an aspect of this discovery.

The problem that the reader solves may be simple. But when it becomes the curiosity of the reader, it makes him explore, and the reader tries to solve the problem on his own, he tries to direct his mind to discoveries and rejoice and enjoy his victory.

Thus, the physics teacher gets a great opportunity. If he, during the allotted study time, pulls the student to the prepared exercises, then this extinguishes interest, reduces his mental development. If he develops inquisitive abilities in students, asks students questions about their level of knowledge and helps them to solve these questions with the help of his leading questions, then he leads students to independent reflection.

The development of independent judgment of students is carried out by focusing on solving creative issues, and not on solving practical issues that are worked out in the same form.

V.G. Razumovsky insists that creative issues are new both in a new approach to their solution and in the need to find the principle of its solution. But most often, each reader understands the term "novelty" himself, and therefore the question often arises as to whether this or that issue can be considered creative.

Of course, one cannot draw a clear line between creative and logical questions. Strictly speaking, in any issue that is not similar to Mashkin's (decided according to a template), “problematic” element, the creative nature of which, which goes beyond the previous process, leads to the search for a new principle of solution.

To awaken interest in solving problems in physics, organizing its thinking and applying it in the process of solving problems, it is necessary to select questions of interesting content.

For example, let's compare the following two questions

1. the foundation of the pyramid of Cheops with a mass of 5.84 MT covers an area of 5 hectares. How to press it to the base. How much more is this pressure by 30 kN / cm2 than the pressure that steam gives to the foundation of the Kalan tower.

2. What pressure is exerted on the floor by a child weighing 48 kg. The surface of children's shoes is 320 cm2.

Both of these questions relate to the subject of physics, ‘pressure of solids’, and are determined by the formula P=F/S. But the first issue attracts the attention of readers more than the second.

This is the connection of new information with other sciences. (history, biology) the external attractiveness of the issue activates the reader's interest in trying to solve it, leads to the solution of the issue. If the issue is complex and the readers’ strength is not enough to solve it, then, of course, their interest in such an issue will quickly fade away. In the process of implementing the solution of the issue, the reader must be sure that each step is correct and use only those laws and formulas that are not true doubt. The use of dubious formulas and reasoning in the process of solving leads to dubious results.

After the answer is found, it will be necessary to teach the reader to look critically at the solution obtained, to look for a way to check the result.

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