SOLUTION OF PRACTICAL PROBLEMS IN PRACTICAL PHYSICS LESSONS IN ACADEMIC LYCEUMS

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Annotation
The article describes the specific aspects of organizing practical training classes in physics for academic lyceum students. In the future, most of the graduates will choose natural and concrete and technical sciences. Therefore, the need and ways to prepare graduates to learn physics in technical higher education institutions have already been shown.

Keywords: organization of practical lessons in physics, academic lyceum students, formulation and solution of physics problems and comparison with table values.

Solving problems in physics reinforces the theoretical knowledge. In the process of solving problems, students understand the essence of basic physical laws and formulas, develop skills in applying them to specific physical processes. Also, in the process of solving problems, they develop skills in calculating, working independently with the necessary literature and textbooks Each physical phenomenon and process is approached based on methods that lead to the formation of a specific direction of intellectual activity. Each branch of physics is based on postulates, and complete descriptions of the physical phenomenon under study can be determined on the basis of these postulates, which should be reflected in the solution of the problem. We, as teachers, should take into account students' problem-solving abilities when assessing their level of knowledge in physics. Teaching students to solve problems is the most difficult, interesting, and important task. D.Poyning "How to solve the problem" In his book, "Problem solving is an art... when learning to solve problems, you acquire this art by observing how others do it, imitating it, and finally practicing." The study of the "Mechanics" section of physics begins with the chapter on kinematics. Students, knowing the laws of motion of a material point during the solution of a problem, can determine all the magnitudes of the motion at any moment in time. When studying the "Dynamics" section, the teacher should focus the attention of students not on Newton's second law, the relationship between force, mass and acceleration, but on the law of motion of a material point under the influence of force. Such a methodological approach ensures that students correctly study the basics of mechanics. The interaction between physics and mathematics is reflected in the formation of skills in students to use the differential equation of Newton's second law. According to the content of the problems, they are divided into different purposes. The problems can be practical problems that demonstrate the skills of determining unknown physical quantities as a result of calculation, differentiation, integration, or the determination of an unknown physical quantity by applying one or another law. There may also be tasks that develop students' independent thinking skills when solving a particular problem. Despite the different purposes of the tasks, they are solved according to the following general plan: - the condition of the problem is fully studied by reading; - the values of the physical quantities given in the problem are written down and brought to the same unit; - the unknown physical quantity given in the problem is determined; - the equations and formulas necessary to quantitatively determine the unknown physical quantity are written down; - it is necessary to pay attention to the uniformity of the literal expressions in the formulas of the given physical quantities; - the equation of the unknown quantity is determined based on the given formulas; - the unknown physical quantity is determined by substituting the given numerical values into this equation; - the unit of the unknown physical quantity is derived. The formation of students' problem-solving skills in physics is one of the important stages of controlling their acquired knowledge. It leads to the formation of independent thinking in students not by solving problems of the same form (only the numerical value changes), but by solving problems of a creative nature. Depending on the conditions of physical problems, their creative organizers can be divided into the following: - the unknown being sought is not directly related to the applied formula; - the presence of clear evidence in the presentation of the problem; - the fact that not all the information necessary to solve the problem is taken into account. We give examples of physical problems that satisfy these organizers: 1. The fastest submarine of the 20th century can reach a speed of 77.8 km/h and descend to a depth of 762 m. What would be the pressure at such a depth? Given that the Earth has a radius of 6400 km, how many times could it circle the Earth in a year without surfacing? 2. What pressure would a child with a mass of 47 kg and a shoe sole with a leather sole exert on the floor?

This problem can be solved by applying the formula $p = \frac{F}{s}$, which was studied in the topic "Pressure of Solids" [1, 2].

It can be seen that the first problem is more interesting for students or the problem conditions contain new information for them and connections with other subjects. The appearance of the problem that attracts the student's attention is a means of activating the student's interest in solving the problem. If the problem is complex enough and the student is not able to solve it, then the student's interest in solving this problem will certainly disappear. Therefore, it is necessary to try to select problems taking into account the skills and abilities of each student in the class and the development of the level of knowledge of the students. We give as an example two problems for studying the topic "Movement in uniform accelerated motion" in physics for students of an academic lyceum [4, 5]. In terms of appearance, the problem conditions do not differ in any way, but the method and result of their solution are different.

1. How far can a braking car $\vartheta_0 = 5\frac{m}{sec}$ travel while moving $t = 3sec$ at the same initial speed and $a = 2\frac{m}{sec^2}$ acceleration?

2. How much distance does a braking car $\vartheta_0 = 5\frac{m}{sec}$ cover, moving $t = 3sec$ with the same initial velocity and acceleration? At first glance, it might seem that both problems can be solved using the formula $s = \vartheta_0 t - \frac{at^2}{2}$ for calculating the distance covered in uniformly decelerating motion:

However, calculating the problem using this formula, especially in the second problem, leads to a completely incorrect result. In both problems, the car moves with uniform deceleration and stops after some time. In the second problem, the car stops after 5 seconds and does not move for the last 6 seconds. Therefore, students need to analyze the last situation and solve the problem by substituting 5 seconds, not 6 seconds, for the time in the path formula for uniformly decelerating motion. In other words, it is possible to determine how long the vehicle's speed will be zero from the equation of instantaneous velocity ($0 = \vartheta_0 - at$) in straight decelerating motion, and then the braking path can be found from the road formula in straight decelerating motion.

In practice, it is always necessary to obtain the necessary information to solve the problem from tables or from the Internet. The problem can be given in the following form: Physics is constantly evolving: the flow of discoveries in it increases from year to year. Write a brief description of the discoveries made in physics in recent years, the discoveries made in the field of physics over the past decade, and which scientists have won the Nobel Prize. Such a problem is important if students are required to search for the necessary information from various sources to discuss the condition of the problem and solve it. In addition, during the lesson, an experienced teacher can formulate some problems and obtain results using the equipment available at school. For example, when solving problems on the topic "Friction Force", (for this we need blocks made of various materials, a dynamometer, and a rubber mat), first the weight of a wooden block is measured using a dynamometer, and then the wooden block attached to the dynamometer is moved smoothly across the desk. The students are explained that the reading of the dynamometer is equal to the friction force, and the expression for the friction force is used.

$F = \mu mg$ the coefficient of friction between wood and wood can be determined and compared with the value given in the table [3].

As we know, the coefficient of friction is a constant quantity that depends on the type of substance, so it is possible to determine the coefficient of friction between the rubber and the wood by moving a wooden block over the rubber. Also, when solving problems on the topic of "Archimedes' force", using the dynamometer, load and beaker with water available in the classroom, students can be taught to formulate problems and determine the density of the prepared material by hydrostatic weighing and compare it with the table value. The formation of the skills of graduates of general secondary schools to formulate and solve such problems will prepare them for their future study at technical universities. Because currently, issues related to the direct application of theoretical knowledge to practice are being considered in order to train qualified and competitive personnel. On the basis of the above principle, it is possible to create and solve problems based on the possibilities of the school physics laboratory on the determination of the coefficient of friction, the density of matter by the method of hydrostatic gravity, and other topics. This is a decisive factor in the training of promising engineers.

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