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THE IMPORTANCE OF PRACTICAL TRAINING IN TEACHING PHYSICS

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Abstract:
This article shows the methods of developing students' interest in physics, the organization of independent learning in practical classes. In addition, aspects of the use of questions related to the assessment of classes in the classroom and in extracurricular activities in academic lyceums and secondary schools taught through advanced physics training are shown.

Keywords: high school, advanced class, quality problem, evaluation problem, power, force, airplane, engine, clapeyron equation, boundary value, physical model, physical observation, skill, scientific research.

It is known that in order to build New Uzbekistan and take our place among developed countries, the demand for highly qualified engineers and inventors, technical personnel in various industries is increasing both in terms of quantity and quality. In this direction, it is necessary to form the foundation in high school to prepare specialists who are competitive and meet the above requirements. Taking this into account, schools and special classes specializing in physics and mathematics have been established in our republic in recent years.

Time demands a new approach to the educational process in these organized physics classes. If we analyze the foreign experiences, including the teaching of physics in the presidential schools established in Japan, Korea and our republic, they mainly focus more on practice than theory. Because by studying physical laws and various processes, they should understand the physical basis of processes in nature and technology. This requires further development of students' scientific outlook, logical thinking and ability.

In secondary schools, during the educational process, there are mainly 2 types of practical exercises in physics, i.e. laboratory work and problem solving.

It is not enough to organize practical training in this form if we take into account that the students of the specialization in physics-mathematics will become scientists or engineers conducting scientific research in the future.

In order for the students to have a thorough knowledge of physics, they should introduce quality issues and assessment issues in addition to the traditional issues in the classroom activities.

Quality issues require a correct understanding of the underlying process and an understanding and description of the interdependence of processes based on physical laws. [3]

In the evaluation issues, it is required to calculate the value of the required physical quantity using the working formula, dividing the physical quantities involved in the process into basic and non-basic physical quantities, which are involved in the process.

Therefore, in order to solve the assessment issues, it is necessary to understand the physical phenomenon that will occur, to create a model taking into account the main physical quantities, and to know whether the obtained result is close to reality.

Assessment questions are more complex than those given in a simple textbook or problem set. Therefore, it is necessary to use such questions in the classes of secondary schools where physics is taught in depth and in the groups of academic lyceums specializing in specific sciences. In our previous articles, we proposed working on problems and their methods for estimating the limit values of some physical parameters in simple problems for the formation of students' skills.

When students acquire skills and basic skills, it will be possible to slightly increase the level of complexity of the problems worked on in the lessons.

Assessment issues can be conditionally divided into three groups.

Problems of the 1st type are like simple problems, and almost all values are given and the result is assessed to be true. For example: the results obtained for quantities such as speed, acceleration or friction coefficient during the operation of the problem are based on whether the problem can be solved or not by comparing it with the real quantity. Such issues are reviewed and discussed in [2].

In type 2 problems, it is required to estimate some quantities through the physical parameters involved in the physical process.

Type 3 problems mainly require the calculation of some quantities of the subjects participating in the processes taking place in the environment.

We can cite the following problem as an example of type 2 problems.

Issue: What is the minimum engine power required for a light aircraft with a horizontal deflection angle of 5^0 to take off on a horizontal runway at a speed of 150 km/h. Mass m=2000kg. Assume that the plane is always horizontal.

Solving: Analyzing the issue

Stage 1 will focus on why the minimum requirement is discussed and the following conclusions will be drawn. The engine power used to propel objects of the required mass in the air must be sufficient to perform this activity. Otherwise, it can take off with an engine of optional power.

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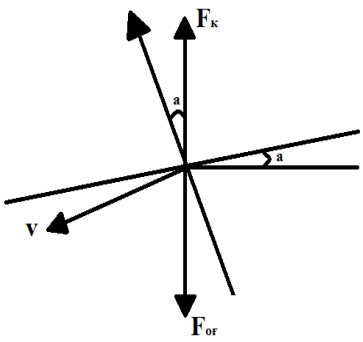

In the 2nd stage, it is explained how the wings of the airplane help to fly, the appearance of the lifting force caused by the deviation of the wing to the horizon and its schematic view are explained. (drawing)

As can be seen from the diagram, the wing receives a force impulse due to the collision of the air flow with the wing of the aircraft. The vertical component of this force impulse lifts the aircraft into the air. So: $F_B = F_K \cos\alpha = mg$. In addition, there is also a horizontal component of the force impulse, which is equal to the following.

$$\frac{F_T}{F_B} = \tan\alpha, \quad F_T = F_B \tan\alpha$$

In that case, the total pulling force should be equal to the horizontal component according to the direction.

It should be noted that the drag force is slightly greater than this because the friction and resistance forces that occur between the air flow and the plane's surface are not taken into account.

So engine traction power

$$N = F_T \vartheta = F_T = F_B \tan\alpha = \vartheta mg \sin\alpha$$

at small angles $\tan\alpha = \sin\alpha$

It is necessary to learn to use approximate values in the evaluation, that is, since $\sin\alpha = \alpha$ for small angles

$$\alpha = 5^0 = \frac{180^0}{36} = \frac{\pi}{36} = 0{,}085$$

Then we get the following value for power.

$$N = \vartheta mg \sin\alpha = 43 * 2000 * 10 * 0{,}085 = 73100$$

$$N = 73{,}1 kW$$

In order to strengthen the working skills of this type of problem, students are presented with the problems of evaluating the engine power of devices such as cars, helicopters and rockets.

Problem solving is an integral part of a comprehensive study of physics at any level. That is, this opinion is appropriate from the student who has started elementary study of physics to the student who receives specialized education. In addition, there is another important aspect of practical training in teaching physics. That is, each issue leads to a serious, sometimes very brief conclusion about the essence of physical phenomena and laws, their level of generality, limits of application, their place in the general picture of the world.

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