ON THE CONNECTIVITY OF PHYSICS AND MATHEMATICS IN HIGH SCHOOL EDUCATION

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Abstract.*The question aboun connectivity physics and mathematics in the educational system is investigated. It was shown that interdisciplinary integration is presented as a means of increasing students' independent creative abilities, increasing and shaping their worldview and scientific thinking, and ultimately improving the entire educational process.*
Key words: *Interdisciplinary integration, physics, chemistry, mathematics.*

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Аннотация.*В работе изучена проблема междисциплинарной интеграции в образовательной системе. Было показано, что междисциплинарная интеграция представлена как средство повышения самостоятельных творческих способностей студентов, повышения и формирования их мировоззрения и научного мышления и, в конечном итоге, улучшения всего учебного процесса.*
Ключевые слова: *междисциплинарная интеграция, физика, химия, математика.*

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Annotatsiya.*Maqolada ta'lim tizimiga fanlararo integratsiya muammosi o'rganilgan. Fanlararo integratsiya talabalarning mustaqil ijodiy qobiliyatlarini oshirish, ularning dunyoqarashi va ilmiy tafakkurini oshirish va shakllantirish, pirovardida butun ta’lim jarayonini takomillashtirish vositasi sifatida ko‘rsatilishi ko‘rsatildi.*
Kalit so'zlar*: fanlararo integratsiya, fizika, kimyo, matematika.*

INTRODUCTION

Since the beginning of the last century, theoretical and experimental research methods have provided fundamental scientific results for many natural sciences, including chemistry, medicine, mathematics, astronomy and biology. The inventions created in a long time in physics led to the appearance of a completely new and modern science. An example of this is electrical engineering, radio engineering, electronics, automation of technological processes, nuclear energy, nanophysics, synergetics and many others. The role and importance of physical science in achieving the above factors is invaluable. It should be noted that with such a rapid rising of development of science and technology, it is very important to ensure the integration or interconnection between academic disciplines.

The problem of interdisciplinary integration is one of the main problems of pedagogy, which contributes to the comprehensive development of the general worldview of future specialists, will improve the quality of scientific knowledge, the systematic mobility of education. The methodological basis of interdisciplinary integration is the integrity of the material world, the unity of theory and practice, the transformation and development of the universe, society and thinking, and the psychophysiological foundations of human thinking or the nature of thinking. This makes it possible to study new aspects of the studied disciplines and has wide coverage and the acquisition of knowledge, skills and practice in the form of a deep, essentially integrated system, to form the basis for the formation of personal qualities [1].

We widely use the concepts of mathematics in the analysis of physical laws at secondary schools. From the historical point of view, the mathematics has played a very important role in the development of physics. In this paper, we analyze the problem of the intercommunity problem for topics in physics and mathematics in secondary schools on the basis of simple experimental tasks. There are many examples of the interaction between physics and mathematics. For example, the coordinate line in the subjects of mathematics, the placement of numbers in it, the concept of negative numbers, students will have the opportunity to learn the principles of operation of physical instruments, the principle of operation of a thermometer. The concepts of surface, which are covered in the subject of mathematics, allow to easily master the concepts of pressure, volume, density in physics [2].

In the elementary grades, students will be able to use everything from simple homogeneous equations to quadratic equations in solving physical problems. Students do a lot of measurement work while experimenting in lab classes. In order to easily master the topic, students must first know the concepts of length, surface, ratio, percentage in mathematics. For example, in the 7th grade physics course of secondary schools, mathematical concepts such as percentage, projection, inverse proportion, combinatorial elements, surface and volume are widely used in conducting laboratory classes on Archimedes' laws [1]. In a 5th grade math textbook, definitions of the concepts of nicbat, proportion, and inverse proportion are given. The concepts of surface and volume are also described in detail in the math course of this class. Elements of combinatorics are given in the 7th grade mathematics textbook. Hence, we hope that if we analyze the process of conducting the above-mentioned laboratory classes through the mathematical concepts we have mentioned, the level of mastery of the lesson by the students will be much higher. One of the most important forms of interaction between physics and mathematics is the solution of mathematical problems in the physical context. It is useful to solve problems (related to motion, density) that apply to both physics and mathematics at the same time. Therefore, we often feel the need for mathematics in the process of practical training in physics or when solving problems.

RESULTS AND DISCUSSIONS

1. In the mechanics section of a physics course, you have to use different mathematical functions and their graphs to solve problems [2]. For example, one of these is the simplest linear function.

A straight line is a road in straight motion. Knowing the velocity of a material point in a straight line, it is possible to calculate the path it has traversed in a given time. Vector expression of displacement

$$\Delta\vec{s} = \vec{s} - \vec{s}_0 = \vec{v} \cdot (t - t_0). \tag{1}$$

The formula for calculating the path for the length of the displacement vector in a straight line is equal to the distance traveled

$$\Delta s = s - s_0 = v \cdot (t - t_0). \tag{2}$$

The path taken by an object at any time t is based on (2)

$$s = s_0 + v \cdot (t - t_0), \tag{3}$$

is calculated using the formula. It can be taken as a counting head in the study of motion. In that case the migration formula

$$\vec{s} = \vec{s}_0 + \vec{v} \cdot t, \tag{4}$$

appears. The last formula is called the equation of motion of a material point. For example, the equation of motion of an object with initial position s_0=5 m and velocity v = 2m/s is given by (4).

$$s = 5 + 2 \cdot t$$

using this expression to find the path taken by the body at any given time [2]. When conducting experiments, it is convenient to express the movement using a table. Many laws in physics are created using tables obtained in experiments. Let’s create a table using the equation of motion given in the example above (see, Table 1).

Table 1.

T, s	0	1	2	3	4	5	6	7
s=5+2t, m	5	7	9	11	13	15	17	19

In solving problems of physics, we encounter parabolic functions in addition to the functions listed above. For example, in the mechanics section of physics subject, the motion of a body to fall freely in a gravitational field, and in the work and energy section, the kinetic energy formulas are represented by parabolic functions (Table 2).

Table 2.

Physical functional connections	Mathematical functions
$h = g\frac{t^2}{2}$ $E = m\frac{v^2}{2}$	$y = a\frac{x^2}{2}$

To fully understand the essence of a physical phenomenon, of course, it is better to use its graphs of parabolic function according to the last table.

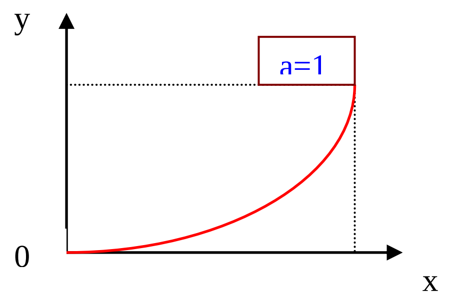

Fig1. The graphic of parabolic function

For example, in mathematics, a graph of a simple parabolic function can be thought of as in Figure 1. In this case, it is possible to create a graph of the given function by compiling a table, knowing the field of definition of the quantities involved in the equation, the field of values. Once the reader has analyzed the laws of change of this given function, this knowledge can be easily applied to physical problems [3].

CONCLUSION

In conclusion, we believe that the use of basic concepts and formulas of mathematics in the teaching of physics in secondary schools, especially in laboratory classes and problem solving, plays a very important role in developing students' ability to quickly and easily analyze topics.

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