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USAGE OF MATHEMATICS IN OTHER SCIENCES

Introduction. Mathematics is the science of quantitative relationships and spatial forms of the real world. It includes such disciplines as arithmetic, algebra, geometry, trigonometry, higher mathematics (analytic geometry, linear algebra, calculus, differential, and integral calculus, etc.). Each of them studies quantitative relations and spatial forms of the world in a special aspect and acts by their methods. Mathematics is one of the most important sciences. Today there are no spheres of human life where mathematics is not needed. Not a single discovery can be done without it, not a single invention works, not a single enterprise or state functions, therefore, the range of everything where mathematics is needed is quite wide.

Review of recent publications. The topic of using mathematics in other sciences was popularized by the following scientists: Dr. Margaret Wright of Bell Labs and Prof. Alexandre Chorin of the University of California-Berkeley volunteered to address the need for this interplay between the mathematical sciences and other sciences and engineering in a report to the Division of Mathematical Sciences. Jeremias Benjamin Richter devoted his dissertation to the using of mathematics in chemistry. Also, there is the interesting paper "The role of mathematics in our lives" by Commissarov M. L.

The objective of the paper is to show the use of mathematics in other sciences and our daily life and to study sciences (professions) where mathematics is indispensable.

Result of the research. Mathematics is widely used in the industry. Mathematical models, graphs are very often used in industry and, in particular, in the preparation of certain reports. Construction is indispensable without mathematics - builders need to calculate how much material needs to be spent on the construction of an object, what length should the object be. Every worker needs mathematical knowledge. Basic formulas and rules of geometry are used in construction calculations: formulas for calculating the areas of the most important geometric shapes. The volumes of the most important solid shapes are pyramid, cone, ball. You need to understand how much is it technologically possible before embodying a project. The all the details must be calculated.

In jurisprudence, as in mathematics, the same methods of reasoning are used. The purpose is to reveal the truth. Any lawyer, like a mathematician, must be able to reason logically and be able to apply inductive and deductive methods. Therefore, the future lawyer forms his professional thinking while studying mathematics. Statistics plays an important role in law practice because you can make reliable conclusions and correctly process information.

The first systematic research on mathematical models in biology belongs to A.D. Lotke (1910-1920). His models haven`t lost their value even now. The founder of the modern mathematical theory of biological populations is an Italian mathematician Vito Volterra, who developed the mathematical theory of biological communities with the apparatus of differential and integrodifferential equations. Some connections between biology and mathematics have become commonplace. This applies primarily to genetics and the study of population dynamics [1].

Mathematics is also used in medicine. Mathematics is an extremely powerful and flexible tool for the study of the world around us. Any scientific discipline has its methodology based on the performance of the specific experiments. Then this information is recorded and processed as numbers. And since the processing of numerical information is a mathematician task, that's a connection between math and medicine [2].

Both biomedical scientists and mathematicians speak of "models". For a biomedical scientist, a model is a living system that mimics some aspects of a more complex biological system, e.g. a disease. But cancer cells extracted from a patient and grown in vitro are no longer the same cancer that was originally in the patient. Nutrients and signals received from the bloodstream are not the same as those in the culture medium. Biomedical researchers use patients` cancer cells to study their possible vulnerabilities. Mathematical models describe real systems by abstraction and mathematical formalism. They enable extrapolation beyond the situations originally analyzed, allowing for quantitative predictions, inference of mechanisms, falsification of underlying biological hypotheses, and quantitative descriptions of relationships between different components of a system. They cannot replace experimental results but may complement experimentation by providing a broader picture. This in turn may prompt novel findings for some cancer-related problems.

Therefore, a combination of approaches using both types of models has the potential to provide more robust findings in cancer research. A search in the Web of Science database for “mathematical model” and “cancer” in 2018 returned 66 000 hits. That number includes papers using statistical models, which are relevant but not the kind of tools that applied mathematicians use to gain insight on problems. A narrower search for “differential equation” (one of applied mathematics` preferred modeling tools) and “cancer” gave 1518 results [3].

The task of physics is to identify and understand the relationships between observable quantities. Let’s back to the 18th century. The Italian scientist A. Volta said: “What can be done good, especially in physics, if you do not reduce everything to measure and degree? " Without mathematics, you cannot describe the physical picture of the world. The physical problems are solved by using math. So, for example, to solve the flat problems of hydrodynamics we use the theory of complex numbers. The vector calculus is used in all areas for the physics of vectors.

Conclusion. In summary, all modern life would be impossible without knowledge of mathematics. We wouldn't have good houses because builders haven`t been able to measure, count, and construct. Our clothes would be very uncomfortable, as they need to be well cut, and for this to be measured accurately. There would be no railways, no ships, no planes… There would be no radio, television, cinema, telephone, and thousands of other things that make up a part of our civilization. So, we need mathematics everywhere, and there is no area of life without mathematics.

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PREVENTION OF THE DEVELOPMENT OF THE SIDE EFFECTS DURING USING DEXAMETHASONE (EXPERIMENTAL STUDY)

Introduction. World Health Organization (WHO) Director-General Tedros Adan Ghebreyesus has named dexamethasone as the only effective drug for severe cases of COVID-19. Already in June 2020, Gebreyesus called for an increase in the production of dexamethasone for the treatment of severe patients. On 2 September 2020, WHO issued an interim guideline for the use of dexamethasone based on evidence from seven clinical trials. The document contains two recommendations: WHO strongly recommends oral or intramuscular administration of corticosteroids (dexamethasone) for the treatment of patients with severe and critical COVID-19; the regimen and duration of the course is carried out once a day for 7-10 days at a dose of 6 mg [1].

But dexamethasone is often used experimentally by physicians and biologists to simulate steroidal diabetes. Along with the stimulation of glyconeogenesis in the liver, dexamethasone inhibits glucose oxidation, enhances the breakdown of proteins, and inhibits their synthesis. With an increased release of amino acids from tissues and their entry into the liver, the process of transamination and deamination of amino acids, which are used for gluconeogenesis, is significantly accelerated. The