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Proceedings of the Conference on March 14 - International Day of Mathematics

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GREETINGS TO THE PARTICIPANTS AND A NOTE ABOUT THE DAY OF MATHEMATICS AND MATHEMATICS

MIRJANA VUKOVIĆ

ABSTRACT. After a short greeting addressed to those present, the paper begins with a note about March 14 – International Day of Mathematics and ends with a panoramic view of mathematics – the queen of sciences by Gauss.

Dear colleagues and fellow mathematicians, above all dear friends,
Dear participants of *the Conference dedicated to March* 14^{th} *– the International Day of Mathematics*, *which we are celebrating for the first time at our Academy of Sciences and Arts of Bosnia and Herzegovina*,
Dear students, especially students of my high school – Third Gymnasium – I hope that at least some of you will become future mathematicians and thus succeed us as your teachers and professors,
Dear participants – Ladies and Gentlemen!

It is my great honor and pleasure to greet you on behalf of the *Academy of Sciences and Arts of Bosnia and Herzegovina* – the temple of all sciences, including mathematics, and especially the Department of Natural Sciences and Mathematics, which is the organizer of this Scientific Conference, as well as on my behalf. I am honored to be a part of this wonderful conference in which my former students participate – that is, my students with their students, and especially because the conference is dedicated to our dear mathematics. On this occasion, I must mention the first mathematicians – my great and dear teachers, academicians Mahmut Bajraktarević and Fikret Vajzović, to whom I was an assistant, Manojlo Maravić and Veselin Perić, who were my mentors, for my doctorate and master's degree.

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I will begin my presentation with a beautiful sentence by academician physicist Anatoly L. Bukhachenko: *"There is a real miracle in the world – it is Mathematics, a divine, royal science, a magical invention of people, created at the top of the mind and the tip of a pen. This miraculous science has the magical ability to predict the unpredictable and connect the unconnected. It amazes with its magical and mystical ability to predict properties and phenomena."*

So isn't it natural that a special day is dedicated to such a special science to emphasize its importance? Thus, at the proposal of the *International Mathematical Union*, the 40$^{\text{th}}$ General Assembly of UNESCO, in November 2019, declared *March* 14$^{\text{th}}$ *as the International Day of Mathematics*.

Since then, March 14$^{\text{th}}$ has been celebrated as *International Day of Mathematics*, while until 2020, that day was celebrated as π*-number Day* or π*-Day*. Even as π*-Day*, that date was very significant for mathematics. Namely, it is well known that the problem of squaring the circle – one of the oldest and best-known problems (negatively) was solved only when the transcendence of the number π was proven (*Ferdinand von Lindemann*, 1882), which also speaks of the importance of the number π. Proclaiming March 14$^{\text{th}}$ as International Day of Mathematics highlighted the importance of mathematics – *the "queen of science"*!

It is difficult to list all the reasons *why the International Day of Mathematics is important.*

First of all, mathematics is present in our everyday life. No matter how uninteresting, even boring it may seem to some, it is certainly one of the oldest and most important sciences, both for education and for life in general, because it develops the ability to think and teaches us an analytical way of thinking. Mathematics promotes wisdom and quickens our minds. But mathematics is also essential in a world of constant change.

History proves that mathematics is an old science, along with philosophy, one of the oldest. In ancient times, and even for a long time after that, there was almost no philosopher who was not at the same time a mathematician and vice versa.

Thus, the aforementioned problem of squaring the circle was being solved by numerous mathematicians for almost 2500 years. In the Rhind papyrus, a rule for approximately determining the side of a square whose area is equal to the area of a given circle is presented, but the Greeks were not satisfied with approximate solutions. The first surviving records of the problem of squaring the circle testify that it was already dealt with in the 5$^{\text{th}}$ century BC. *Anaxagoras* – the founder of the Athenian school of philosophy and *Antiphon* from Athens, as well as *Archimedes*, and much later *Leonardo da Vinci*. All attempts to solve this problem, as well as the attempts of Arab mathematicians who also dealt with this problem and determined the number π much more precisely (*Al Kashi* in the 14$^{\text{th}}$ century), remained without results. Much later, the German mathematician *F. Von Lindemann* showed that the number π cannot be elementary constructed, as well as that π is not a solution to any algebraic equation with integer coefficients. The problem of squaring the circle was practically reduced to the construction of the number π.

From everything that has been said so far, it can be seen that already with its paradigmatic place in the domain of human knowledge, independent of all other valid reasons,

mathematics deserves a special place.

The oldest known thinkers of the ancient civilization noticed the characteristic of the mathematical form of knowledge and since then it has served as a model of scientificity and a measure of exactness of the overall knowledge.

Thus, already in the Middle Ages, mathematics, in its division of that time, constituted two of the seven skills, for which study was dedicated the traditional university (geometry and arithmetic) in the quadrivium. And the third seventh – logic in the trivium, today, in the relevant part, in the form of mathematical logic, would also be classified in the domain of mathematics.

In the foundations of the new century, in the spiritual and material implications of which, by the way, we still live today, Gallilei's knowledge is incorporated, according to which *"the book of nature is written in the language of mathematics"*, while, according to Kant, *"individual scientific disciplines reach the level of scientificity as their need for the language of mathematics in the formulation and expression of one's knowledge"*.

Now we will say something more about mathematics and hierarchy in science in general, as seen by *Friedrick Turner*[1] a specialist in social sciences from the University of Texas:

"There is, he says, a pyramid of science. The base of that pyramid is mathematics, not because it is more abstract, or because it is in some sense *"better or more loved"* than other sciences, but because it does not have to rely on any other science, while physics, which belongs to the next layer (floor) of the pyramid, must inevitably relies on mathematics. The floor above physics is chemistry, which cannot do without its support, and its support is, of course, what is below it, that is physics. The next floor is biology, which must rely on a good knowledge of both physics and chemistry."

With an old saying, this could also be expressed oppositely: physicists admit only to mathematics, and mathematicians only to God, that it is above them.

I will end the story of mathematics with *Gauss's saying "mathematics is the queen of science", Gauss is the prince of mathematics*, and the saying of the great Swedish mathematician *Gösta Mittag-Leffler*: *"The best work of mathematicians is art, highly perfect art, like the most secret dreams of the imagination, clear and bright. Mathematical genius and artistic genius touch each other."*

In addition, March 14^{th} is celebrated to popularize mathematics, as a science that played a significant role in the development of civilization, and which is of great importance, both for the present and for the future of civilization.

Therefore, March 14^{th} – *International Day of Mathematics* is also important for raising the level of awareness of the importance of mathematics, not only because it contributes to the development of logical thinking through school, but also because it has an extremely wide application in all areas of everyday life, including, in addition to physics and technology, even medicine, music, sports, as well as numerous other fields.

And finally I would like to extend my heartfelt gratitude to all of you for this wonderful Conference, especially to my ex-students, to all who presented your papers, as well as

[1]Leon Lederman (with Dick Teresi), God Particle (In serbian), Series of Popular Science SFINGA, Beograd, 1998.

to students of my high school – Third Gymnasium.

I am especially thankful to two of my dear ex-students now colleagues – university professors Mehmed Nurkanović and Amela Muratović Ribić who initiated this event and have lightened up the spark within you and put in a lot of effort to organize this event and prepare this Proceedings dedicated to my jubilee.

Academician Mirjana Vuković, ANUBiH

SOME PHOTOS FROM THE CONFERENCE

Academicians M. Vuković and D. Milošević before the start of the Conference

Conference participants: academicians B. Peruničić and L. Lincender Cvijetić and professors V. Vladičić and M. Pikula

Students of the Third Gymnasium who participated with their presentation: Andrea Božinović, Ema Džafić, Amina Bahtanović, Fatima Fulurija, and Dženita Podžić