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12th Middle European Mathematical Olympiad
27.8-2.9.2018 ■ Bielsko-Biała ■ Poland

MEMO

MEMOLETTER

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We were also in Cracow

On Friday the excursion to Cracow took place. The participants started to gather next to the reception desk at 7:15 and, after a short wait for the latecomers, we hit the road a little behind the schedule.

It took about two hours to get there and after arriving at the city centre we ate pretzels and went for a walk through the Old Town. We saw St. Florian's Gate, Cracow Barbican, Bishop's Palace and heard Cracovian legends and stories. Subsequently, we came across the bench with the statues of Stefan Banach and Otton Nikodym which attracted interest of all MEMO participants who begun taking photos, laughing and eating cookies. Then we visited Wawel and came back to the Main Square where everyone enjoyed their free time, drinking coffee and buying souvenirs. After a delicious lunch we boarded buses and went to the Faculty of Mathematics and Computer Science of the Jagiellonian University where we heard an interesting lecture about the history of Cracovian mathematics conducted by Krzysztof Ciesielski, Ph.D.

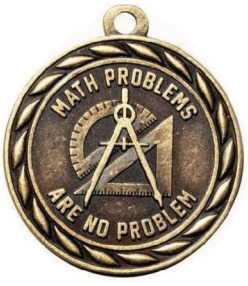
We came back to the hotel after a two-hour jurney just for dinner.

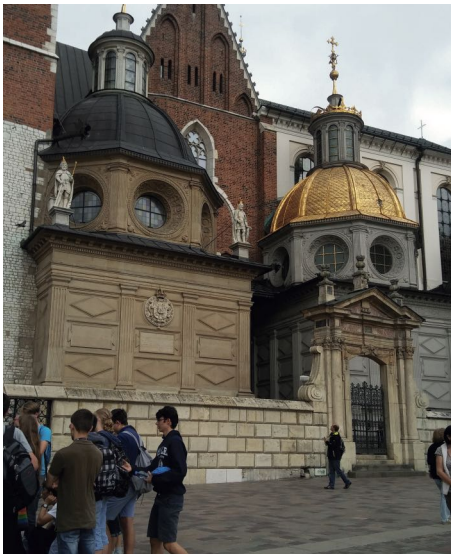
Weronika Ormaniec
student of High School No 5, Bielsko-Biała

MEMO 2016
Individual competition

There are $n \geqslant 3$ positive integers written on a blackboard. A move consists of choosing three numbers a, b, c on the blackboard such that they are the sides of a non-degenerate non-equilateral triangle and replacing them by $a+b-c$, $b+c-a$ and $c+a-b$.
Show that an infinite sequence of moves cannot exist.

Can you solve it?





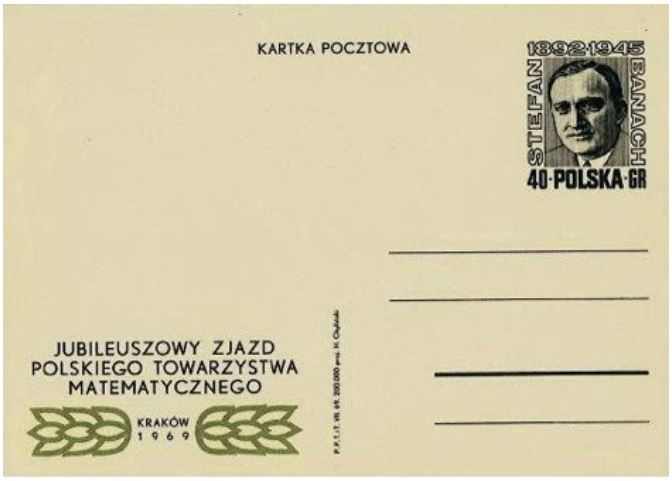
Mathematical postage stamps

It is no secret that professions such as engineers, IT specialists, astronomers and bankers are based on mathematics as it provides a basis for all the sciences. But has anyone ever expected to come across mathematics while sending a postcard from the seaside or posting a letter?

Mathematics is the subject of 84 stamps in 26 countries around the world (most Nicaragua-21 and Hong Kong-19). Mathematicians are portrayed on 274 stamps in 67 countries around the world (most Nicaragua-21, France-19 and Poland-15). As it turns out, mathematics is even more present in our everyday lives than one might think. Since the beginning of the 20th century, mathematicians of each epoch and their achievements have been shown on stamps, starting with the famous Pythagoras and ending with John von Neumann and the well-known "game theory". Analyzing the number of stamps issued, Isaac Newton undoubtedly wins - the prints showing his portraits, concepts or important events from his life exceed a hundred. A lot of attention was also paid to Johannes Kepler and the laws of the planetary movement written down on the basis of his work.

One of the first stamps on which we notice a mathematical accent is the caricature of Gottfried Wilhelm Leibniz on a 1926 print. This comprehensively educated German is known for, among other things, the improvment of Newton's differential calculus, the construction of the prototype of the mechanical calculating machine and the introduction of the concept and symbol of the integral. Compared to contemporary stamps, this one had a poorer graphic design, but intrestingly a higher price.

The first Polish philatelist valor dedicated to mathematics was a postcard (całostka – a postcard with a printed toll stamp) published in 1969 on the occasion of the Jubilee Congress of the Polish Mathematical Society in Kraków with an image of Stefan Banach (1892-1945), one of the creators of functional analysis, born in 1892, the former professor of the university of Lviv is one of the most recognizable Polish scholars. Stefan Banach's image was also placed on the stamp in 1982 in the series "Polish Mathematicians".



Apart from him, Stanisław Zaremba (1863-1942) the author of works on partial differential equations, Wies1aw Sierpiński (1862-1969) the author of works in many fields of mathematics and Zygmunt Janiszewski (1988-1920) one of the founders of Warsaw school of topology, appear there. Despite a considerable choice of stamps, it is worth focusing on a few specific specimens. A picture from the "Poles in the World" series published by PWPW(Polish Security Printing Works) in 2009 deserves special mention. It presents three Polish cryptologists against background of the white eagle: Marian Rejewski, Jerzy Różycki and Henryk Zygalski, who made significant contributions to the effort towards breaking the Enigma code in 1932. The Polish Post celebrated the 50th anniversary of breaking the Enigma by issuing a stamp with the symbolic letter "E" in 1983, while a postcard (całostka) dedicated to Marian Rejewski was issued in 2005 on the centenary of his birthday. Another special feature is the graphic design commemorating the 125th anniversary of the establishment of the World Postal Union. It was founded in 1874 and is still in operation today, making it one of the oldest international organisations in the world. In the foreground there is a portrait of the outstanding Blaise Pascal, whose presence argues for the contribution of mathematics also in such inconspicuous matters as philately.

In the "Polish Millennium" series of 2001, a fragment of a woodcut depicting Jan of Głogów (1445-1507) called Głogówszczyk or Głogówita, an outstanding mathematician, astronomer and philosopher, professor of Kraków Academy and the teacher of Nicolaus Copernicus, was placed on a stamp symbolizing education. The other figure on the stamp is Tadeusz Kotarbiński, a philosopher.
Mathematical stamps undoubtedly attract attention and are an interesting element of parcels, and in the stamp albums of philatelists they can occupy distinguished positions. Thus far they have been printed in many countries all over the world. Let us make sure that they are not forgotten.

This pictures come from:
http://jeff560.tripod.com/stamps.html
Kazimierz Polak
former principal of High School No 5, Bielsko-Biała
and
Helena Chwierut, Mikołaj Nabagło
students of High School No 5, Bielsko-Biała

The Extraordinary Effectiveness of the Mathematical Description of the World IV

As we have noticed, the meaning of the question of the mathematicality of the world depends on the understanding of the nature of mathematics. I admit that the discussion on this topic is far ended. The most important issues are still open: Can mathematics be reduced to a game of symbols? Are mathematics created or discovered? In what way do mathematical objects exist? Are mathematical theorems subject to change with the progress of our mathematical knowledge? What meaning for the foundations of mathematics have limit theorems?

Posing these few questions indicates their philosophical context. We understand that we cannot answer them without employing ontological and epistemological solutions of the philosophy of mathematics regarding the following issues: the object of mathematical research, the existence of mathematical objects, veracity in mathematics, methods used in mathematics or the relationship between mathematics and logic. Not wanting to elaborate upon these issues in detail, I would like to remark that the problem of the object of mathematics seems to be the dominant one, as the adoption of its solution determines the solution of the remaining problems.

Noticing the ease with which the world submits to mathematized research, we come to a conclusion that the world must have a certain trait that enables this process. In this context, Eugene P. Wigner remarked about the 'incomprehensible comprehensibility of the world'[1] and Einstein said that 'the most incomprehensible thing about the world is that it is comprehensible' [2]. The world could be deprived of the quality of comprehensibility in multiple ways. Michał Heller indicates here on the M quality (Mathematics capitalized) of the world [3]. Otherwise, the world in our understanding would be non-mathematical and incomprehensible [4].

We are astonished by the fact that we can have a dialogue with the world in the language of mathematics. As we know, this dialogue is possible, because on one hand, there is a stability of structures and certain constant relations describable in the language of mathematics are maintained, and on the other hand, the language of mathematics can be developed independently of the research of nature , where after some time, particular mathematical formulas are used to describe the processes that really occur in the world.

It transpires that many developed, purely mathematical solutions inspires people to change the scientific image of the world, to deepen their understanding, but this process happens in mathematical dialogue with the world.

dr hab. Krzysztof Śleziński prof. UŚ

[1] E.P. Wigner, Niepojęta skuteczność matematyki w naukach przyrodniczych, trans. J. Dembek, 'Zagadnienia Filozoficzne w Nauce' 13(1991); M. Heller, J. Życiński, A. Michalik, Matematyczność przyrody, Ośrodek Badań Interdyscyplinarnych, Kraków 1992.

[2] A. Staruszkiewicz, Co znaczą słowa Einsteina 'Bóg jest pomysłowy, lecz nie złośliwy'?, 'Roczniki Filozoficzne KUL' 28(1980)3, p. 67-69.

[3] Heller, Co to znaczy, że przyroda jest matematyczna?, [in:] M. Heller, J. Życiński, A. Michalik, Matematyczność przyrody, Ośrodek Badań Interdyscyplinarnych, Kraków 1992, p. 15.

[4] M. Heller, Czy świat jest matematyczny?, [in:] M. Heller, Filozofia i wszechświat. Wybór pism, Universitas, Kraków 2006, p. 48-53.

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