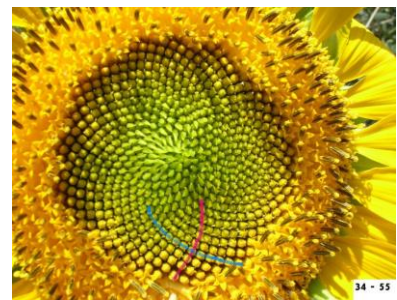


## Inaccessible Queen?

Complex equations, difficult theorems and incomprehensible graphs represent the frequent image of mathematics that is fixed in the minds of many people. This stereotype gives rise to fears of applying mathematical methods on a day to day basis. Meanwhile, the queen of sciences can be helpful when negotiating salary, choosing a candidate for an employment vacancy, or planning a multistage journey. It lets us decide which bank rate is the most beneficial, check how changes in open pension funds or an introduction of a flat tax rate influence our household finances. It also often makes it possible to solve complex criminal cases. Amazing? For those who are at least a little bit interested in mathematics - not necessarily. However, what is astounding is how little attention is paid by the modern world to the science which is an essential factor in the development of civilization and has, as a matter of fact, a huge influence on human life.

Stock Exchange quotations. Sunflowers. Classical architecture. The reproduction of bees. Pine cones. Roman poetry. What do they all have in common? These and many other formations of natural or human creations seem to be connected by a sequence of numbers, which was discovered at the beginning of the 13th century by a mathematician from Pisa, Leonardo Fibonacci. The Fibonacci sequence starts with numbers 1, 1 and the next term equals the sum of the two preceding terms: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89,.... named after their originator, the numbers that make up the sequence are called the Fibonacci numbers. Long ago, attention was drawn to the deep relationships between nature, culture and mathematics. The Fibonacci sequence is spectacular evidence of this. For example, many plants grow along spiral lines, whose number reflects the neighbouring values of the above mentioned sequence. On the surface of a pineapple, 8 spiral lines lie in one direction and 5 or 13 in the other direction; on the sunflower disc there are respectively 55 and 89 of them. The number of petals of many flowers is also expressed with one of the Fibonacci numbers: buttercups have 5 of them, bloodroots - 8, and asters often have 21 petals.



The sequence described by the mathematician from Pisa can also be applied in music and art. Ancient Greeks, and Renaissance artists who followed their example, applied proportions resulting from the calculation of the quotients of the neighbouring Fibonacci numbers in their works. The so called „golden ratio principle”, or the „divine proportion principle” (division of a segment into two parts so as the ratio of the longer part to the shorter part is the same as the ratio of the whole segment to the longer part) is present in the architectural elements of the Acropolis of Athens.

In the second half of the 20th century the Fibonacci sequence was popular among composers, who used it, among others, for the proportional arrangement of rhythm or harmony. Rumour has it that even the proportions of the legendary violin constructed by Antonio Stradivarius are based on the numbers of the sequence.

This simple example shows that the role and possibilities of mathematics significantly exceed its common understanding. The queen of sciences stimulated the development of each of the ancient civilizations known to us. The Mayan people could foresee eclipses of the Sun and calculate the length of time of one revolution of the Moon around the Earth to an accuracy of three decimal points. Ancient Egyptians built pyramids with the ideal shape of a regular pyramid and walls oriented according to the four cardinal directions. Chinese generals could quickly assess the numerical force of their huge armies using the method known today as the Chinese remainder theorem.

The meaning and role of mathematics in social life have not been reduced over time, quite the contrary. Today knowledge in the field of game theory is generally applied in business and negotiations, and the notions used in probability theory - expected value or risk - are used on a day to day basis in the insurance business. Another field of mathematics - the number theory (which for ages was considered very abstract even by mathematicians) is used in cryptography, among others when developing security systems protecting our bank accounts against very real threats.

Could the world exist without mathematics? It would have to be a world in which one could not think mathematically, i.e. one could not create any model of the phenomena taking place. Everything would be random and we could not forecast what will happen next. Probably there would not be sunrises and

sunsets, seasons of the year and any other cyclical events. It would also be impossible to reason or draw conclusions. It is impossible to even imagine such a world, which proves how much human thinking depends on the mathematical dimension of reality. Paraphrasing philosopher Ludwig Wittgenstein, one can say that „the limits of our world are the limits of our mathematics”. Its progress stimulates not only technological development, but it also gives a better understanding of the world.

The stereotypes that for years have developed around mathematics do not encourage the Poles to learn the secrets of the queen of sciences. Despite the fact that in our country we have many outstanding mathematicians whose scientific achievements are known all over the world, awareness of the possibilities provided by this field of science is small, and interest in it is too small as well. But even when searching for a job, calculating statistical salaries in a given business, analysis of the number of job advertisements from the last month or indices of the availability of specialists in a given region will surely give us information which can be useful in negotiations with a potential employer.

In the opinion of Professor Stefan Jackowski, president of the Polish Mathematical Society, „the problem with mathematics exists because it is perceived in isolation from the history of the world and there is no culture of talking about mathematics”. „Mathematics is first of all the history of human development, which has determined the way we live today even more than any political events, wars or uprisings. Therefore, it should be put into an everyday context, its various aspects should be presented” – adds professor Jackowski.

The key for the development of mathematics and a better understanding of it is the cooperation of the business world, the scientific community and the Ministries: of National Education and of Higher Education. An example we should follow in Poland is surely that of our western neighbours, who announced 2008 as the Year of Mathematics. In Germany politicians and important public figures took part in the popularization of that field of science, with Chancellor Angela Merkel to the fore. And these are not groundless actions - the profession of a mathematician is the best profession of the world – according to the report published by the American portal CareerCast.com.

In Poland, there are very few activities promoting and popularizing mathematics. Therefore, initiatives

such as the International Stefan Banach Prize: *The International Stefan Banach Prize for Doctoral Dissertation in the Mathematical Sciences*, established by the Polish Mathematical Society and Ericpol Telecom, awarded for the best doctoral dissertation in the field of mathematical sciences, are worth highlighting. The aim of the Prize is to promote and support financially the most talented young researchers dealing with the mathematical sciences. The winner of this year's third edition of the competition will be announced by the end of May 2011.

Additional information about the International Stefan Banach Prize is available from the website [www.banachprize.org](http://www.banachprize.org).

**Ericpol Telecom, [www.ericpol.com](http://www.ericpol.com)**, is the largest Polish exporter in the ICT industry, one of the major software providers for the telecommunications industry and the largest IT company in the Łódź province (2009 rating, Computerworld TOP200). In 2011, Ericpol was the only Polish company listed in the ranking of the 100 best outsourcing companies in the world, in the category called „Rising Star” (annual rating of the International Association of Outsourcing Professionals (IAOP)). The company was established in 1991 and at present it employs more than 1100 persons. Apart from the locations in Łódź, Cracow and Warsaw, the Ericpol Group is composed of subsidiaries in Ukraine, Belarus and Sweden. The company operates in the area of telecommunications, rendering outsourcing services, providing leasing of highly qualified engineering teams, as well as providing dedicated solutions and services.

The company also participates in activities aimed at promoting young Polish scientists in the area of mathematics. Together with the Polish Mathematical Society it has initiated the International Stefan Banach Prize for the best doctoral dissertation in the mathematical sciences.

**Polish Mathematical Society (PTM), [www.ptm.org.pl](http://www.ptm.org.pl)**, was established in 1919 in Cracow. At present it has 18 divisions covering the whole country. The PTM brings together mathematicians primarily connected with higher education and research institutions. The most important objectives of the PTM include supporting mathematical research, applications, popularization of mathematics and mathematical education, cultivating the history of Polish mathematics, as well as integrating and representing the issues of the Polish mathematical community. It is a founding member of the European Mathematical Society. An important area of the PTM's activities is awarding prizes for achievements in mathematical research, applications of mathematics and its popularization. The PTM also organizes numerous scientific conferences, both domestic and international, and publishes six scientific magazines.