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## Mathematics is daily life

Krzysztof Cywiński, the author of „Mathematics for humanists, the dyslexic and... other hopeless cases”.

### Why don't you like the way math is taught at schools?

**Krzysztof Cywiński:** The teachers of this subject lack the proper preparation to share knowledge. They are mainly highly educated people, but completely not ready to share their skills with their students. That part of their occupation they must master on their own. Nobody teaches them that. Some of them do it well, some do it worse. Another thing is the predisposition to tend the occupation of a teacher. Last year in September in Kraków, at the University of Pedagogy I played my movie “Jolly Mathematics for common people”. And it fascinated those “common people”. Matura (leaving-school exam) students say, that they had learned more about math than they had learned during their 12 years of attending school. Whereas scientists, teachers, did not comment so positively. I am terrified by the plummeting level of educating, especially in the sphere of general knowledge and math.

### You are not a mathematician by occupation and you criticize others. Please reveal your innovative method of teaching those hopeless cases.

To understand mathematics, we must look at examples and situations of our daily lives, not just simply force abstract equations or theorems about enigmatic numbers. The study of mathematics should rather be based on understanding normal, casual sentences. In my book, I have included my own explanations of mathematical terms, so that the children, teenagers and parents would understand, ex. I tell about multiplication to be a shortened form of addition, or that instead of writing  $2+2+2=6$ , we use the “dot of ultimate laziness”, and shorten it to:  $3 \times 2=6$ . Secondly, I focus on each term in the correct, according to students, order. And I change the procedures which have been developed in the last 150 years. I present my own method of working out equations and converting formulas. This is the most essential skill that students must acquire at school. Teaching math, just like teaching everything else, is a practical activity. I'll give you an example: since fractions are a form of dividing numbers by one another, then, for example, the fraction  $\frac{2}{3}$  is another form of dividing the number  $2:3$ . And because this is division, the theoreticians of teaching math, around the whole wide world, introduce fractions to school systems when the students can count, subtract, multiply and divide, so in the fourth grade (in Poland – children around 10

years of age). I do it a lot earlier. Having explained to pre-school children what fractions are and how to note them, I teach them about how to add and subtract them.

### **While listening to your lectures, can even the most stubborn student comprehend fractions, functions, equations, and get an A while passing the matura exam?**

Research shows, that about 10% of the population cannot achieve this, even theoretically. In Poland, only 5% of all matura students pass with an A grade. Any student, that is familiar with the multiplication table, can be easily prepared for the basic level of matura within a few weeks. Last year I lead an 11-days-long preparation course to matura at the Gdansk Upper School of Administration. About 100 students attended daily. I showed them, that you can learn a lot within ten days.

### **A lot of students do not try hard enough to study math. They think this subject does not play a big part in life, because computers count for us. How to convince them that they should master it at least basically?**

I think Charles Darwin did it best, saying that math equips us in some sort of an additional sense. Let's look at one of them, for example the sense of seeing. Someone born colour-blind, sees the world without the ability to recognize certain colours. In a way, it's a world of black and white. Such human cannot imagine that it can be any different. And someone who just happened to lose the ability to see and recognise colours, would really painfully realize what they have lost. It's the same with mathematics. You must first master it, use its tools in order to see the complete value of the world. A mathematical analphabet lost nothing and cannot even imagine what they have lost. It's like space expeditions. I remember some people saying that such things are a waste of money, and so on. Today, thanks to those expeditions we have road navigation, television, and so on. Since I have begun to work with math, my intelligence tests' results have risen by a few percent. Please keep in mind, that nowadays, employers are happy to give their future employees various tests. And that IQ test is often significant.

### **When do first problems with math occur and how to handle them?**

Research shows, that 25% of 7-year-old children have poor arithmetical intuition and do not qualify to go to schools. A warning sign for the parents should be their child's first grades that are under A. Mathematics, just like learning languages, requires the knowledge of the whole material. At school, we don't require the comparison of the battle of Grunwald with the battle of Monte Cassino. Same with geography or biology. Tests verify the child's knowledge from the last few classes. When we study languages, we don't try to remember when we learned the word "bike", you just have to know it. It's similar in math. The formula for the area of a square is taught to children in the fourth grade, and they just have to know it by heart. If the child shows some sign of problems with math in elementary school, it should be considered to pay attention to it and explain the matter. Parents should support the child, so that it works harder, and should help it study all that they lack.

**You even have a method for little children. Is it not too early for a pre-school child to learn multiplication, and adding and subtracting fractions?**

Many years ago, professor Edyta Gruszczyk-Kolczyńska carried out research, which showed, that 57% of children that played mathematical games in kindergarten, were later said by the teachers to be exceptionally skillful in math. Only about 11% of the children, despite taking part in such games, did not gain success in that subject because of some trauma, such as their parents' divorce or a disease. The rest of the children had average and over-average results. The research proves, that children are ready to study math when they turn three. The obstacle would be noting down work-outs, and that is why children begin to study math in their second grade (note: about 8 years of age). According to my view, this is too late for them. Besides, the fact that they must note everything down, absorbs 50% of their attention. Thanks to the mathematical cards have created, they focus on the acquisition of the essence. The inspiration for the cards also included long talks with specialists of dyslexia: speech therapists, psychologists, teachers, publishers. They all complained that despite them having the didactic tools to teach children about Polish, they don't have the tools to teach math. Thanks to these cards, the children with bad handwriting, the dyslexic or with dysgraphia, can shamelessly compete with children without such problems.

This gives fantastic progress in acquiring mathematical skills. I've been looking after three pre-school children: a 5-year-old girl and two 6-year-old boys. I have established a learning programme for them, learning math through fun and games. I get help from their parents and grandparents that find 10-15 minutes, once or twice a week for mathematical games. First results come three months later. The children can name numbers up to 1000, they add and subtract, they understand fractions and think they are easy. In comparison I might add that according to school rules, first graders need nothing more than learning how to count to ten. Next year, my little students will understand most of the terms typical for the elementary and secondary school.