

What is it to learn mathematics?

Prof. RNDr. Milan Hejný and prof. RNDr. František Kuřina say:

To learn mathematics does not mean to contend with definitions, theorems, formulas and proofs but with their interpretation.

Is mathematics a structure defined by axioms and developed into system definitions, theorems and proofs? Although many authors in this way mathematics comprehend and also teach it in such way, **we do not treat it as correct** and that not only from pedagogical view. Present mathematician **Phillip A. Griffith emphasizes**: We can describe to mathematics as research for structures and regularities, which order and simplify world. The structures are not the basic attribute of mathematics but its searching. The approach to mathematics does not lead from above, from completed structure. **The approach to mathematics is the approach gradual build of mathematical world.**

What it the mathematics?

Mathematics = the art of to calculate
the art of to see
the art of to prove
the art of to construct
the art of to abstract

To know means to comprehend connections, to be able to formulate questions and problems and to solve them, to be able to apply theory. Back in 1921 **Karel Čapek** wrote: „...*To know, it is temporary, but to understand, it is permanent enrichment of intellect...*“.

Do we teach mathematics correct?

The teacher, who teaches so that the pupils do not understand to mathematics but after all they successfully graduate it, contributes to incompetent awareness of publicity about uselessness of mathematics. Formally “learned” mathematics is naturally almost **no applicable** and it **does not develop** any deeper cognitive skills of pupils. It develops perhaps only mechanical memory of pupils and it is very few. With the formal access to teaching the mathematics contributes to demoralization of pupils and to reduction of the quality of the education system.

We take it of course that the well conceived and well realized teaching in practice make a great difference not only for **cognitive development** of pupils but also for their **individuality development**. There fall especially mental potency and function from the following abstract which we comprehend only as inspiration for the teacher, not as opinion of some theory of cognitive skills.

The development of cognitive skills of pupils:

- analyse of process, situations and relations
- cultivation of process of abstraction
- invention and evaluation of connections
- solution of problems
- production of terms
- understanding to process
- algorithmic, structural and conceptual thinking
- generalize
- development of creative thinking
- proving of contentions
- cultivation of application of mathematics ...

The cultivation of attitude of pupils:

- formulation of own ideas
- ability critical perceive ideas of others
- critical assessment of mistakes
- useful reaction to mistakes
- development of imagination not only geometric
- explanation and argumentation
- ability organize sets of information
- cultivation of methods and consistency...

The development of phrase of pupils:

- gradual understanding of languages of mathematics
- differentiation contention and definitions
- cultivation nonverbal and symbolic phrasing ...

This was written mainly for the teachers of the primary school. **What we change the word pupil for the word student?**