

# Physics ... in a few steps

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## Extended abstract

As the whole Romanian society, the study of physics has witnessed great changes lately. It is difficult to assess now if this is “for better” or “for worse”, but the results may be seen at the teachers level. There are many factors leading to this new approach to the importance of physics in the young people’s education. Their analysis could make the object of a separate study, which goes beyond the limits of this paper.

However it should be mentioned that physics is a difficult subject, which requires much study and even small sacrifices sometimes. Today’s students are more hasty, their preoccupations are different from the generations of the 70-ies and 80-ies, their access to information is wider and their time is used differently. For most of them physics is essentially “something unpleasant”. This could account for the fact that in the last decade fewer and fewer students chose physics as a subject for their baccalaureate or University entrance exams.

The alignment of high-school education to the EC standards has led to fewer physics classes in high-schools, alternative school books, the using of computers or the Internet in teaching, Many times the new methods have been criticized for fair or less fair reasons.

Under these circumstances it is necessary to find solutions to make physics more accessible and consequently attractive to more and more students. Such solutions should be directed not only to physics loving students, but also to middle level students, which makes the majority.

The main physics notions taught in high-schools can be presented in a concise, easy and attractive way in the form of reviewing tables. They may be successfully used for the half-yearly and annual reviews, as well as for the study for the baccalaureate and technical universities entrance exams (grill tests included).

The tables have been conceived taking into account the physics chapters to be studied in schools and the years of study. They have been structured following the criteria below:

- a) Tables representing principles, laws and theorems
- b) Tables representing physical phenomena
- c) Tables representing physical magnitudes
- d) Tables describing analogies between certain physical phenomena

The paper presents several examples of the four above-mentioned categories.

a) The principles, laws and theorems studied at mechanics, electricity, thermodynamics and nuclear physics have been synthesized in 7 tables. They include: denomination of principle/law/theorem, enunciation, mathematical expression, physical magnitudes significations and certain specific observations. Examples: Classic mechanics principles, Laws and theorems in classical mechanics, Principles and laws of fluid mechanics, Laws of stationary electric current, Thermodynamics principles.

b) In order to understand the basic phenomena, 8 tables have been drawn up, including the following elements: denomination of the phenomenon, definition, specific mathematical relations, observations and applications. Examples: Straight-line movements, Mechanical waves, Electromagnetic waves, Electromagnetic induction, Atomic nucleus transformations, Wave optics, etc.

c) The 8 tables on physical magnitudes include denomination of the physical magnitude, its definition, mathematical expression, measuring units and specific observations. Examples from such categories: Types of force in mechanics, Magnetic forces, Electrostatic field of a point charge, Magnetic field of the electric current, Optical systems, Photometry, etc.

d) The analogies between straight and rotation movements and between the mechanical and electromagnetic oscillations are also presented in tables.

These tables are no substitute for the traditional or modern teaching methods. They are a complementary element providing a “bridge”

between all alternative school books. The above-mentioned method has been successfully used in

“Horia Hulubei”, “Stefan Odobleja” and Greek-Catholic High Schools.