

***INNOVATIVE EDUCATIONAL TECHNOLOGIES, INFORMATION TECHNOLOGIES
(MATHCAT, MAPLE MATHEMATICAL PACKAGES), METHODS OF IMPLEMENTING
PLANETARIUM PROGRAMS FROM ASTRONOMY TO PRACTICAL TRAINING***

Sayfullaeva Gulkhayo Ikhtiyor Kizi Navoi State Pedagogical Institute, Phd

Annotation:It can be shown on the basis of comprehensive analysis that in the conditions of modern education informatization, educational methodical complexes of astronomy created on the basis of interactive computer models are an important factor in raising the level of preparation of physics teachers for the specialty, and in this case, the representation of the sky in a figurative form leads to an increase in student activity and interest in learning astronomy

Keywords:Maple 5, Maple 6, Maple 7, Mathcad, astronomy, planetary, programm

The main purpose of the Maple package and its capabilitiesThe Maple environment was created in 1980 by Waterloo, Inc. (Canada).created. Today it has the following versions: Maple 5, Maple 6, Maple 7

In Maple, the core for working with symbolic expressions is the schema kernel. It consists of hundreds of basic functions and algorithms of symbolic expressions. At the same time, the operator consists of a basic library of commands and functions.In total, there are 2500 functions in Maple 5, 2700 in Maple 6, and 3000 in Maple 7. This means that many issues can be solved by communicating directly with the system.

Maple has the ability to solve a large number of problems without programming. It is only necessary to write an algorithm for solving problems and divide it into several parts. In addition, there are thousands of problems with solving algorithms in the form of functions and system commands. Maple has three separate languages: input, solution, and programming. Maple is an integrated programming system designed for mathematical and engineering calculations. It is a powerful system for working with formulas, numbers, text and graphics

The package is very convenient to use. Its interface is made so convenient that the user works with the program sheet just like a sheet of paper. He writes numbers, formulas, mathematical expressions and jokes on it.

The Maple system has a text editor, powerful computing and graphics processor. A text editor is used to enter and edit texts. The text consists of annotations, and the mathematical expressions included in it are not executed. Text can consist of words, mathematical expressions and formulas, special characters and hyphens. The main feature of Maple is the use of commonly accepted symbols in mathematics.

The computing processor has a wide range of capabilities. He is a sophisticated mathematicianperforms calculations according to formulas. In addition to having many mathematical functions, it provides the ability to calculate series, addition, multiplication, derivative and definite integrals, work with complex numbers, and solve linear and non-linear equations, perform operations on vectors and matrices.The graphics processor is used to create graphics and display it on the screen.

The graphics processor is used to create graphics and display it on the screen. The graphics processor provides the user with the most convenient and simple options of graphics tools. The user can draw graphs of simple functions right from the start of working with the system. Polar graphs, spatial graphs, vector field graphs, and histograms can be created along with traditional graphing. The graph is designed to solve typical mathematical problems. At the same time, it is possible to change the graphic frequently, add text notes to them, and move it to an arbitrary place in the document.

By placing text, graphics, and mathematical calculations in a single workspace, Maple makes even the most complex calculations easy to understand.

To start the Maple program: From the Program (Programs) group in the list of Windows main menu commands, select the appropriate name for this program: Maple. A Maple window is similar to Windows' application windows, with a Title Bar, Horizontal Menu Bar, Toolbar, Workspace and Status Bar, and Ruler and Scroll Bars.

Maple works interactively - the user enters text (commands, expressions, procedures), which is accepted and processed by Maple. The workspace of the Maple window is divided into three parts:

- 1) input field - command line. Each command line begins with a > symbol;
- 2) print area - the results of the execution of the entered commands are given in the form of an analytical expression, graphic object or error information;
- 3) field of text comments - can be an optional text explaining the performed procedure. A text string is not accepted or processed by Maple.

The MathCat package is a software tool for performing calculations, which is designed for professional mathematicians, technologists. With its help, it is possible to solve algebraic and differential equations with variable and constant parameters, analyze functions and search for their extrema, create tables and graphs to analyze the

solutions found, and perform other similar tasks. MathCat also has its own programming language for solving complex problems.

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It can be shown on the basis of comprehensive analysis that in the conditions of modern education informatization, educational methodical complexes of astronomy created on the basis of interactive computer models are an important factor in raising the level of preparation of physics teachers for the specialty, and in this case, the representation of the sky in a figurative form leads to an increase in student activity and interest in learning astronomy.

It should be said that the importance of astronomical knowledge in the development of young people in the perception of the landscape of the universe, in the formation of a scientific worldview, and in the development of modern ideas about the structure of the universe and its physical processes is very important. Because the science of astronomy develops the potential of young people, creates scientific ideas about the universe, encourages continuous study of natural knowledge.

The student's feeling of learning achievement in the lesson is the most powerful factor in increasing interest. In this case, the student should feel what the results and benefits of studying astronomy are, why he needs it, and his inner interest should increase. Also, as a result of applying the acquired knowledge, students will be satisfied with their life experience test and achieve the correct organization of problem-solving algorithms, which will increase their interest in science.

Planetary programs are very useful in solving the above problems. There are several planetarium programs in astronomy, each with its own characteristics and functions

As in all natural-mathematical sciences, the role of practical training in astronomy, cosmonautics and astrophysics is of particular importance in the deep mastering of educational materials. Although solving problems in astronomy has a certain degree of commonality with solving problems in other natural sciences, it also has its own characteristics of solving problems.

In particular, students' abstract thinking and visualization skills play an important role in solving problems related to the positions and movements of stars, planets, the Sun and the Moon. Their problems are qualitative and computational, analytical and synthetic, like in physics, and practicing them more plays an important role in the development of students' thinking, observation, and algorithmic abilities. Below we describe topics related to solving problems that encourage students to think actively in this regard.

Solving problems about the celestial sphere, its main points, lines and circles. Solving problems related to finding the coordinates of the celestial body and the connections between them. Solving problems on finding culmination and culmination heights of lights. Solving problems related to the spherical triangle and its basic formulas. Solving problems related to true and mean solar time and the equation of time. Solving problems on calculating the moment of sunrise and sunset and the azimuths of the sunrise and sunset points. Solving problems related to the refraction of lamps Solving problems related to Kepler's laws and configurations of the planets, solving problems related to calculating distances and sizes of solar system bodies, topics such as Pedagogy Higher educational institutions Physics and astronomy and Physics and astronomy teaching methods are defined for students of the educational direction

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