

TRIGONOMETRIC SUBSTANTIAL AND METHODOICAL LINE IN THE COURSE OF MATHEMATICS

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Abstract. We study the integrative properties of trigonometric substantial and methodical line. We offer the technological methods of formation of abilities in the solving of trigonometric problems.

1. **Introduction.** The basic ideas of the Conception of development of mathematical education in Russia [1] set a vector of its development on all levels – from preschool to high school and postgraduate education. The purpose of activities to implement the concept, including, in the system “school – higher educational institution”, is expressed most capaciously by the thesis: "studying and teaching of mathematics, on the one hand, provide readiness of pupils for mathematics application in other areas, on the other hand, have a backbone function, influence significantly intellectual readiness of school and university students for training, and also the contents and teaching of other subjects".

2. **Integrative properties of trigonometric lines: "horizontal" integration.** In this paper, we address to the trigonometric substantial and methodical line. Trigonometric material is very important in the course of elementary mathematics and this material closely related to geometric, algebraic, functional lines and largely use their methods.

For example, certain steps of the solving of geometric problems can be modeled in the form of trigonometric equations. Formulas algebra are used extensively in the transformations of trigonometric expressions. From the point of view of functional lines, trigonometric equation is a problem of finding the zeros of trigonometric functions and trigonometric inequality is a problem of the intervals of constant sign of them. Thus, we can speak of intra-subject integrative properties of this line ("horizontal" integration).

3. **"Vertical" integration.** With the transition to higher professional education possession of the facts and the methods of trigonometry is fundamental in the development of higher mathematics course ("vertical integration"). Systematize the demanded skills and the sections of course in the following table.

Demanded skills	Sections (topics) of the course
Use the trigonometric ratios in a right triangle.	Vector algebra, the relations of rectangular and polar coordinates, a rotation of a rectangular coordinate system.
Convert trigonometric expressions.	Introduction to the analysis (calculation of limits, the continuity and differentiability of trigonometric functions).
Use the connection formulas of trigonometric functions.	The problem of integration (integration of trigonometric functions and trigonometric substitution).
Determine the signs of the trigonometric functions and apply the reduction formulas.	Complex numbers (trigonometric form of a complex number, multiplication, division, exponentiation in trigonometric form).
Evaluate of the values of trigonometric functions.	Series, and improper integrals (the questions of convergence, the comparison theorem).

Determine the values of the trigonometric functions at the points $n\pi$ and $(2n-1)\frac{\pi}{2}$ (find the zeros of sine and cosine, solve other simple equation).	Fourier series (the calculation of the Fourier coefficients). Boundary value problems.
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Table 1: Vertical integration

As highlighted in Table 1 skills, it is actual the development of effective technological methods of the solving of trigonometric tasks.

4. Technological aspects of the teaching of trigonometry in general are as follows:

- 1) classification of the tasks;
- 2) a statement of the common ways to solve problems of this class; for example, the reduction of a trigonometric equation to the simplest trigonometric equation with the further use of the standard formulas of their solutions;
- 4) the use of special methods for solving problems, depending on their specific characteristics; so, for a linear trigonometric equation is applied a conversion to a simple harmonica;
- 5) the use of visualization tools (a trigonometric circle, graphs of the basic trigonometric functions, etc..)

Detailed development of these technological methods the author intends to devote further work.

References

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