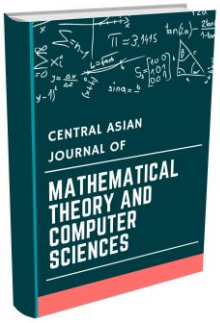

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Things, Short Multiplication Formulas and Their Generalizations

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Annotation

This article describes in detail the specifics of mathematics, as well as short multiplication formulas and their generalizations.

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Trigonometry (Greek: trugonon - triangle and metric) is a branch of mathematics that studies the properties of trigonometric functions, the relationship between the sides and angles of a triangle. Theorems of sines, cosines, and tangents are the main results of trigonometry. The application of trigonometry is very wide. Equivalences that hold for all possible values of the constituent letters, i.e. true for all values of which the left and right parts have meaning, are called expressions, such problems of proving equalities are called problems of proving equality. In today's lesson, we will learn to prove trigonometric expressions. There are 4 main ways to prove trigonometric expressions:

1. Method 1. Show that it is equal to the right part by making real-form substitutions in the left part of the figure.
2. Method 2. Show that it is equal to the left part by performing real form substitutions on the right part of the figure.
3. Method 3. Show that the difference of the left and right parts of the equation is equal to zero. Method 4. Make changes of the same form in the left and right parts of the sentence and express them in the same way.

L.Euler introduced the same designations with the introduction of trigonometric formulas. He determined the signs in each quarter of the trigonometric functions, introduced the formulas for derivation, applied the definition of areas of the functions. Euler was the first to systematically explain that the arguments of trigonometric functions are not only angles or arcs, but also arbitrary numbers. Until then, every trigonometric theorem was proved using the corresponding geometric diagram. Until then, the cases where the trigopnometric functions were calculated were rarely studied. Only in his scientific works, cases of arbitrary arguments of trigonometric functions were fully studied. In conclusion, it should be said that the great scholars Muhammad al-Khorazmi, Ahmad Fargani, Abu Rayhan Beruni, Mirza Ulugbek, Ali Kushchi, Ghiyaziddin Jamshid al-Koshi contributed greatly to the development of mathematics, especially trigonometry. Determining the coordinates of the stars in the celestial sphere, observing the movements of

the planets, predicting the eclipse of the Moon and the Sun and other scientific and practical issues required accurate calculations and drawing up tables based on these calcunations.

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$
$\sin x$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1
$\cos x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0
tgx	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	–	0	–
$ctgx$	–	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	–	0

Finding the value of a trigonometric expression, simplifying requires the student to know the short multiplication formulas, trigonometric formulas and the table of values of trigonometric functions, while solving trigonometric equations and inequalities requires the properties of trigonometric functions (definition and range of values, intervals of increase and decrease, periodicity , even-odd, largest and smallest value, zeros, etc.), reducing the equation (inequality) to the form of the simplest trigonometric equation, to know the formulas for finding solutions (set of solutions), in the process of solving the equation, the roots disappear it requires to be able to analyze cases or cases of rooting.

$$\frac{2tg\frac{\alpha}{2}}{1+tg^2\frac{\alpha}{2}} = \sin\alpha,$$

$$\frac{1-tg^2\frac{\alpha}{2}}{1+tg^2\frac{\alpha}{2}} = \cos\alpha,$$

$$\frac{2tg\frac{\alpha}{2}}{1-tg^2\frac{\alpha}{2}} = tg\alpha$$

$$tg\,\alpha\ ctg\,\alpha = 1,$$

$$\frac{1-\cos\alpha}{\sin\alpha} = tg\frac{\alpha}{2},$$

$$tg(\alpha+\beta) = \frac{tg\alpha+tg\beta}{1-tg\alpha\,tg\beta}$$

and so on, using the definition "from left to right" causes the equation to be defined to expand. As a result, foreign roots appear. However, applying the above definition "from right to left" narrows the domain of the equation. In this case, the roots may disappear. In some trigonometric formulas, both sides of the equation can have the same area of definition and have a reasonable division for all values of the variable. In order to solve an equation involving inverse trigonometric functions, if different inverse trigonometric functions were involved in equation a or the arguments of these functions are different, we can use the same trigonometric function on both sides of the equation to make it convenient to solve the given equation. When solving an equation involving inverse trigonometric functions, it is necessary to check the root (Especially, when calculating using tangent and cotangent, it is necessary to check if there is a root that does not belong to the areas of determination of this function).

Probability theory and mathematical statistics are inextricably linked mathematical sciences. At present, the knowledge gained in these areas is very useful for specialists of various professions. Being able to determine the goal of one's activity and taking systematic steps to achieve it is a characteristic feature of a competent,

competitive specialist, and the theory of probability and mathematical statistics help more than any other science to make positive changes in a person. Knowledge of the laws of mass random processes (the science of probability theory) and important methods and ways of processing the results of observations (the study of mathematical statistics) is useful for solving practical problems for a specialist in every profession. It is impossible to study probability theory and mathematical statistics without first getting acquainted with the basics of combinatorics. In terms of set theory, combinatorics deals with tuples and sets, their unions and intersections, and ordering tuples and subsets in various ways. Checking whether the elements of a set or tuple have a configuration with a given property, and if so, studying the methods of constructing and finding their number, and improving these methods according to a parameter are the main issues of combinatorics.

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