

METHODOLOGY OF METHODS FOR SOLVING TRIGONOMETRIC EQUATIONS

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Annotation. *This article presents methods for solving trigonometric equations found in state examination questions prepared for admission to a higher education institution. And in schools, a textbook on teaching the topic of trigonometric equations was given and pedagogically calculated.*

Keywords: *algebraic method, factorization, bringing to the same-sex equation, planimetry, stereometry*

Introduction. Currently, in our schools, it is necessary to study trigonometric functions in algebra and know how to overcome trigonometric equations, since this topic is complex and very important.

Trigonometric equations are very applicable in solving problems in planimetry, stereometry, astronomy, physics, and other fields. From year to year, issues and examples of trigonometric equations are found in state examinations of admission to higher education.

Analysis and results. The main methods for solving trigonometric equations are:

1. Algebraic method;
2. Factorization;
3. Bringing to the same-sex equation;
4. Move to half an angle;
5. Insertion of the auxiliary angle;
6. Converting a product to a sum;
7. Universal substitution[1].

Method of conducting a lesson on the topic of trigonometric equations.

Purpose of the lesson:

- Educational: solving trigonometric equations in the following ways: algebraic method, factorization method, first-and second-order same-sex equations.

- Discipline: nurture accuracy and attentiveness in solving equations.

- Developer: development of skills for working with a textbook, the formation of a skill for finding the necessary information independently, the application of the acquired knowledge in the course of work.

Lesson method:

UUD: personal: formation of educational motivation, self-esteem and the need to acquire new knowledge;

Communicative: the ability to express one's thoughts in solving equations;

Cognitive: the ability to choose a suitable method for solving an equation depending on the type of equation.

Regulator: formation of conscious thinking.

Equipment: interactive whiteboard, chalk and simple whiteboard, Algebra and the beginning of mathematical analysis 10th grade book.

1. Structure of the lesson:

2.1. Organizational time. Goal setting.

3.2. Updating knowledge.

4.3. Material correction.

5.4. Setting homework.

6.5. Conclusion. Reflection.

During classes:

1. Organizational moment. Greeting students. Register. Setting the topic and purpose of the lesson.

2. Updating knowledge. Facing students with a question

What trigonometric functions do you know?

What solutions do you know of the simplest trigonometric equations?

3. Fastening the material.

We start by solving the equations, and then there will be 25 minutes of independent work.

1) Assignment. a) $\sin 2x = \sin x \left(\frac{\pi}{2} + x\right)$ solve the equation.

Solution: $\sin x \left(\frac{\pi}{2} + x\right) = \cos x$

$$\sin 2x = \cos x$$

$$\sin 2x = 2 \sin x \cos x$$

$$2 \sin x \cos x = \cos x$$

$$2 \sin x \cos x - \cos x = 0$$

$$\cos(2 \sin x - 1) = 0$$

$$\cos x = 0, \quad 2 \sin x = 1$$

$$x = \frac{\pi}{2} + \pi k, \quad k \in \mathbb{Z}, \quad x = (-1)^k \frac{\pi}{6} + \pi k, \quad k \in \mathbb{Z},$$

2) Assignment. a) $2 \cos^2 x + 2 \sin 2x = 3$ solve the equation.

b) Indicate the roots of this equation belonging to the $[-\frac{3\pi}{2}; -\frac{\pi}{2}]$ interval.

$$\left[-\frac{3\pi}{2}; -\frac{\pi}{2}\right]$$

Solution: $2 \cos 2x + 2 \sin 2x = 3$, $3 \sin 2x = 3 - \cos 2x$ in terms of the expression,

$$2\cos^2x + 2(2\sin x \cos x) = 3(\cos^2x + \sin^2x),$$

$$2\cos^2x + 4\sin x \cos x - 3\cos^2x - \sin^2x,$$

$$-\cos^2x + 4\sin x \cos x - 3\cos^2x = 0, \quad /: \cos^2x$$

$$-1 + 4\tg x - 3\tg^2x = 0,$$

$$\tg x = t,$$

$$-3t^2 + 4t - 1 = 0,$$

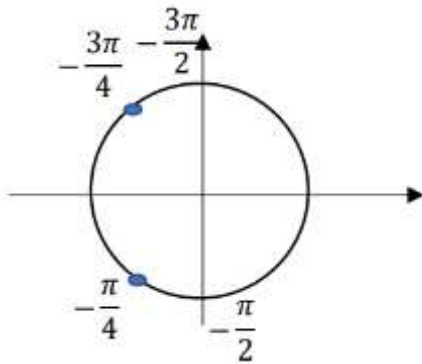
$$3t^2 - 4t + 1 = 0,$$

$$D = 16 - 4 * 3 = 4 = 2^2,$$

$$t_1 = 1 \quad t_2 = \frac{1}{3}$$

$$\tg x = 1, \quad \tg x = \frac{1}{3}$$

$$x = \frac{\pi}{4} + \pi k, \quad k \in Z, \quad x = \arctg \frac{1}{3} + \pi n, \quad n \in Z$$



Answer: a) $x = \frac{\pi}{4} + \pi k, \quad k \in Z,$

$+ \pi k, \quad k \in Z, \quad x = \text{б) } -\frac{3\pi}{2}; -\frac{\pi}{2}$

Conclusion. Trigonometry is one of the most important components of the school algebra course. The topic "trigonometric equations" has an important place in the school course. Without knowing how to solve such equations, it is impossible to study the topics after trigonometry and solve problems. In the article, we examined the topic "trigonometric equations", since this topic is contained in the questions of the unified state exam. In a given assignment, the solution of the trigonometric equation and its roots in the interval were found.

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