TO TEACH STUDENTS HOW TO SOLVE SOME TRIGONOMETRIC EXAMPLES AND PROBLEMS USING ELEMENTS OF GEOMETRY

M. A. Askaraliyeva
Q.D.P.I Teacher

Abstract:

Below we will focus on solving trigonometric calculations and proof of some trigonometric formulas in geometrical ways. Because learning how to solve some examples, problems or formulas of trigonometry together with algebraic methods in geometrical ways increases students' mathematical thinking, interest and thinking.

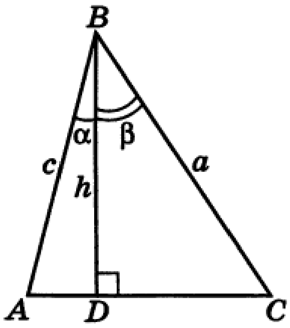
Keywords: Equation, function, elements of geometry.

Example 1. $\sin(\alpha+\beta)=\sin\alpha\cos\beta+\sin\beta\cos\alpha$ prove that

Proof: ABC let's look at the triangle.

In this $BD\perp AC$, $\angle ABD=\alpha$ and $\angle CBD=\beta$ let it be.(Chart 1)

$BC=a$, $AC=b$, $AB=c$ and $BD=h$ let it be



Drawing 1

$$S_{\Delta ABC}=\frac{1}{2}ac\sin(\alpha+\beta)$$

$$S_{\Delta ABC}=S_{\Delta ABD}+S_{\Delta CBD}$$

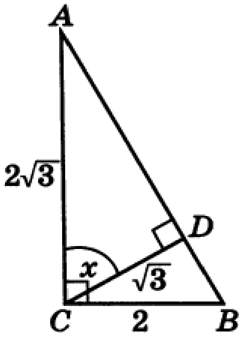
$$S_{\Delta ABD}=\frac{1}{2}c\cdot h\cdot\sin\alpha=\frac{1}{2}c\cdot\sin\alpha\cdot a\cos\beta=\frac{1}{2}a\cdot c\cdot h\cdot\sin\alpha\cos\beta$$

$$S_{\Delta CBD}=\frac{1}{2}a\cdot h\cdot\sin\beta=\frac{1}{2}a\cdot\sin\beta\cdot c\cdot\cos\alpha=\frac{1}{2}a\cdot c\cdot\cos\alpha\sin\beta$$

So, $\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$

2. Example If $\sqrt{15-12\cos x}+\sqrt{7-4\sqrt{3}\sin x}=4$ if X What should be the acute angle?

Solving. Let's look at drawing 2.



2-drawing

$AC = 2\sqrt{3}$ $CD = \sqrt{3}$, $CB = 2$ Then, according to the theorem of cosines,

$AD = \sqrt{15 - 12\cos x}$ and $BD = \sqrt{7 - 4\sqrt{3}\sin x}$ According to the Pythagorean theorem $AB = 4$ So, $D \in AB$ 2 in the drawing ADC the angle is shown as a right angle. We'll make sure it's not a fluke. ΔABC if it is right-angled A the sine of the angle is $\frac{1}{2}$, so $\angle A = 30^0$. ACD according to the theorem of cosines from the triangle
$CD^2 = AC^2 + AD^2 - 2 \cdot AC^2 AD \cos 30^0$ Here, we set $AD = y$. $y^2 - 6y + 9 = 0$; $y = 3$. In this, $AD = 3$ So ACD is in a triangle $\angle ADC = 90^0$. In that case $x = 60^0$ Answer: 60^0
Example 3. $arctg1 + arctg2 + arctg3$ calculate the
Solving. According to diagram 3

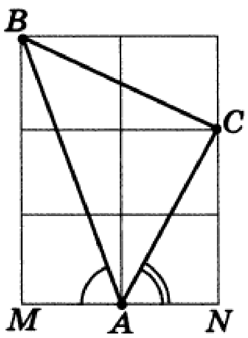


Figure 3

$arctg3 = \angle BAM$, $arctg2 = \angle CAN$, $arctg1 = \angle BAC$.
(BAC - an acute angle of a right-angled equilateral triangle).
So, $arctg1 + arctg2 + arctg3 = \pi$
Answer: π
Example 4. $\cos(arctg3 + arctg0,5)$ calculate the
Solving.

Neo Science Peer Reviewed Journal
Volume 8, April. 2023 ISSN (E): 2949-7701
www.neojournals.com

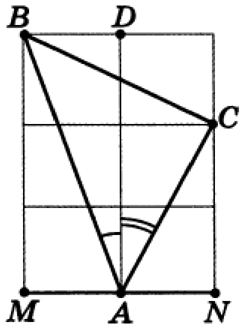


Figure 4

4 in the diagram ABC a triangle is made. In this $ctg\angle DAB = 3$ and $tg\angle DAC = 0{,}5$. ABC right-angled ACB is an equilateral triangle. So,

$$arcctg3 + arcctg0{,}5 = \frac{\pi}{4}, \qquad \cos(arcctg3 + arcctg0{,}5) = \frac{\sqrt{2}}{2}$$

Answer: $\frac{\sqrt{2}}{2}$

Example 5. $ctg\left(\frac{1}{2}\arccos\frac{5}{13}\right)$ calculate the

Solving. If we apply the concept of the cosine and catangent of an acute angle of a right triangle, the Pythagorean theorem and the property of the bisector, the example will be solved instantly.

In Figure 5. $\angle ACB = 90^0$ was ABC a triangle is depicted. $BC = 5,\ AB = 13$ and BM ABC angle bisector

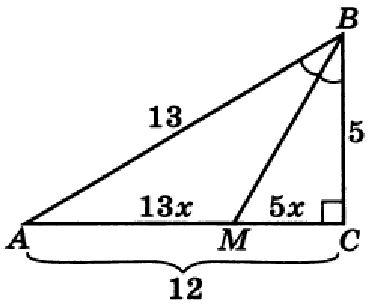


Figure 5

In that case $MC = 5x,\quad AM = 13x,\quad AC = 12,\quad x = \frac{2}{3}$

$$ctg\left(\frac{1}{2}\arccos\frac{5}{13}\right) = \frac{BC}{MC} = \frac{5}{5x} = \frac{1}{x} = \frac{3}{2}$$

Answer: $\frac{3}{2}$.

Example 6. $\arcsin \lg x^2 + \arcsin \lg x = \frac{\pi}{3}$ solve the equation.

Solving. Hypotenuse AB Let's look at the triangles ABM and ABN, which are equal to 1. (Figure 6) $MB = |2\lg x|$ and $NB = |\lg x|$ let it be

In that case, $\angle MAN$ will have magnitude $\frac{\pi}{3}$ according to the condition.

A, M, B, N lie on a circle with diameter AB. Then the length of MN meter is $MN = \frac{\sqrt{3}}{2}$ according to the theorem of sines.

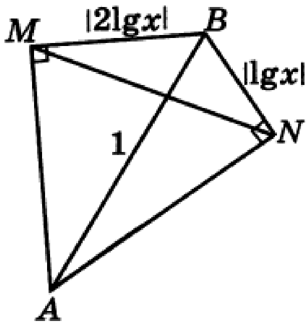


Figure 6

On the other hand, according to the theorem of cosines in triangle MBN

$$MN^2 = MB^2 + BN^2 - 2 \cdot MB \cdot BN \cos\angle MBN$$

$$\cos\angle MBN = \cos\frac{2\pi}{3} = -\frac{1}{2}$$

in that case

$$(\frac{\sqrt{3}}{2})^2 = (2\lg x)^2 + (\lg x)^2 - 2 \cdot 2\lg x \cdot \lg x \cdot \left(-\frac{1}{2}\right)$$

and $7\lg^2 x = \frac{3}{4}$. $|\lg x| = \frac{\sqrt{21}}{14}$

from this $x_1 = 0{,}1^{\frac{\sqrt{21}}{14}}$; $x_2 = 10^{\frac{\sqrt{21}}{14}}$.

Both values satisfy condition $|\lg x| \le \frac{1}{2}$. But x_1 checks result in no root of the equation.

Answer: $10^{\frac{\sqrt{21}}{14}}$

List of Used Literature

1. И.Х. Сивашинский «Элементарные функции и графики» Москва.“Наука” 1968г.[95,134]
2. T. Karimov, K. To‘raqulov. S. Abdullayev. “Maktabda tenglama va tengsizliklar” Toshkent. “O‘qituvchi”, 1992 yil.[54,86]
3. Turg’inov A.M, Asqaraliyeva M.A Matematika to’garaklarida o’quvchilarga ba’zi tenglamalarni tenglamalar sistemasiga keltirib echishni o’rgatish.

4. Turginov Azizjon Mamasaliyevich, Asqaraliyeva Muktasarkxon Azizjon kizi A non – local problem for a third-order equation with multiple chrarasteristics Vol.42,Issue-05,2022 pp.230-241

5. Тургинов А.М., Асқаралиева М.А. об одной нелокальной задаче для уравнения третьего порядка с нелокальным условиям. IJSSIR, Vol. 11, No. 06. June 2022, с 66-73.