SOLVING SOME NON-STANDARD PROBLEMS ABOUT TRIANGLES

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Abstract: Solving of Planimetric problems of different forms and methods are presented in the article.

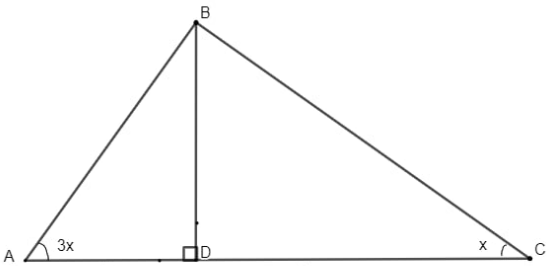
Key words: Elementary mathematics, planimetry, methodical orientation of teaching, formation of information cultures of students, implementation of professional-pedagogical orientation, use of problem system as individualized means of teaching.

The issues of improving the training system of the future mathematics teacher in learning "Elementary Mathematics" course have been discussed in higher educational institutions of pedagogy. Among them, methodical orientation of teaching, formation of information cultures of students, implementation of professional-pedagogical orientation, use of problem system as individualized means of teaching, etc. But these studies in many ways, firstly, do not sufficiently study such an important department as planimetry; secondly, the modern requirements for the preparation of students of

pedagogical higher education institutions in mathematics, especially in planimetry, related to the introduction of the competence approach to the educational process, are almost not taken into account. The planimetry course of the elementary mathematics course connects not only future mathematics teachers, but also representatives of other fields. For example, an architect uses elements of geometry directly when designing buildings, geographers use elements of elementary geometry when determining the scale of maps, determining the meridian, gardeners use elements of symmetry when planting crops, and all professions. In general, the planimetry section of elementary geometry plays an important role in the formation of students' spatial imagination. We will consider some non-standard issues below.

Issue 1

find $?\cos 2x$

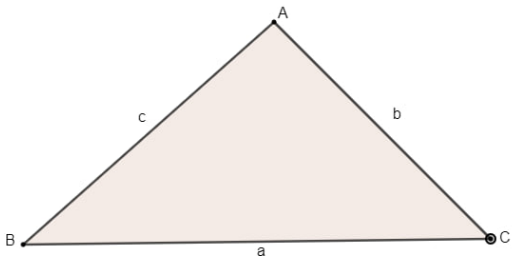


1-rasm

$$\begin{cases} \tan 3x = \frac{BD}{AD} \\ \tan x = \frac{BD}{CD} \end{cases} \Rightarrow \left\{ \frac{\tan 3x}{\tan x} = \frac{\frac{BD}{AD}}{\frac{BD}{CD}} = \frac{CD}{AD} = \frac{n}{m}; \right.$$

$$\frac{\tan 3x}{\tan x} = \frac{3-\tan^2 x}{1-3\tan^2 x} = \frac{3-\frac{1-\cos 2x}{1+\cos 2x}}{1-3\frac{1-\cos 2x}{1+\cos 2x}} = \frac{3+3\cos 2x-1+\cos 2x}{1+\cos 2x-3\cos 2x} = \frac{2+4\cos 2x}{4\cos 2x-2} = \frac{2\cos 2x+1}{2\cos 2x-1} = \frac{n}{m}; 2m\cos 2x = 2n\cos 2x - n, \cos 2x = \frac{m+n}{2n-2m}$$

Issue 2



2-rasm

$$\frac{S}{(ab+bc+ac)_{max}} =?$$

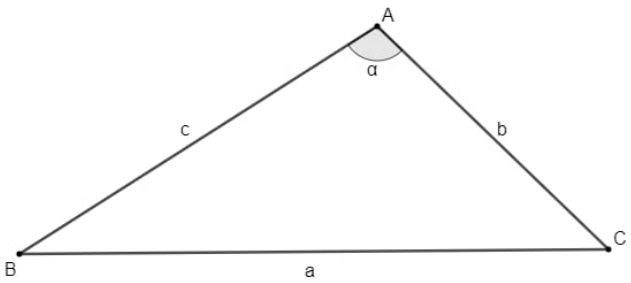
from the place of attitude for$x, y, z \epsilon \mathbb{R} (x+y+z)^2 \geq 3(xy+yz+xz)$

$$(ab+bc+ac)^2 \geq 3abc(a+b+c) = 3 \cdot 4RS \cdot 2p \; [p - bu\ yerda\ yarim\ primetr\ ] = 24R \geq 24Sp \cdot 2S = 48S^2,$$

$$abc = 4SR, \;\; a+b+c = 2p, R \geq 2,$$

$$ab+bc+ac \geq 4\sqrt{3}S, \qquad \frac{S}{(ab+bc+ac)} \leq \frac{1}{4\sqrt{3}} = \frac{\sqrt{3}}{12};$$

Issue 3



3-rasm

$\angle A \geq 60°$

$\left(\frac{b}{a}\right)_{max} =?$

$\cos A \leq \cos 60°$

$\cos A \leq \frac{1}{2}$

$a = \sqrt{b^2 + c^2 - 2bc\cos A} \geq \sqrt{b^2 + c^2 - bc}$

$\frac{a}{b} = \frac{\sqrt{b^2+c^2-bc}}{b} = \frac{a\sqrt{b^2+c^2-bc}}{b^2} = \sqrt{1 - \frac{c^2}{b^2} - -\frac{c}{b}} = \sqrt{(\frac{c}{b} - \frac{1}{2})^2 + \frac{3}{4}} \geq \frac{\sqrt{3}}{2}$

$\frac{a}{b} \leq \frac{2}{\sqrt{3}} \leq \frac{\sqrt{3}}{2}$;

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