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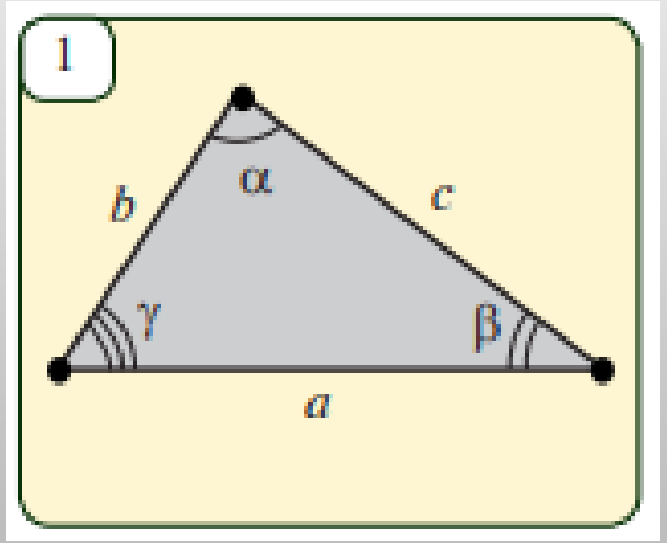
I kurs. GEOMETRIYA

10-Mavzu: **UCHBURCHAKLARNI YECHISH**

UCHBURCHAKLARNI YECHISH

Uchburchakning tomonlarini *a*, *b*, *c* bilan, bu tomonlar qarshisidagi burchaklarni mos ravishda α, β, γ bilan belgilaymiz *(1-rasm)*. Uchburchakning tomonlari va burchaklarini bitta nom bilan — uning *elementlari* deb atashadi.

Uchburchakni aniqlovchi berilgan elementlariga ko‘ra, uning qolgan elementlarini topish *uchburchakni yechish deb yuritiladi*.



UCHBURCHAKLARNI YECHISH

1-masala. *(Uchburchakni berilgan bir tomoni va unga yopishgan burchaklari bo'yicha yechish).* Agar uchburchakda $a=6$, $\beta=60°$ va $\gamma=45°$ bo'lsa, uning uchinchi burchagi va qolgan ikki tomonini toping.

Yechish. 1. Uchburchak burchaklari yig'indisi 180° bo'lgani uchun

$$\alpha=180°-\beta-\gamma=180°-60°-45°=75°.$$

Sinuslar teoremasidan foydalanib, qolgan ikki tomonni topamiz:

2. $\frac{a}{\sin\alpha}=\frac{b}{\sin\beta}$ tenglikdan $b=a\cdot\frac{\sin\beta}{\sin\alpha}=6\cdot\frac{\sin 60°}{\sin 75°}\approx 6\cdot\frac{0{,}8660}{0{,}9659}\approx 5{,}3794\approx 5{,}4.$

(sin60° va sin75° qiymatlari mikrokalkulatorda topib qo'yildi, ularni darslikning 153-betidagi jadvaldan ham topishingiz mumkin).

3. $\frac{a}{\sin\alpha}=\frac{c}{\sin\gamma}$ tenglikdan $c=a\cdot\frac{\sin\gamma}{\sin\alpha}=6\cdot\frac{\sin 45°}{\sin 75°}\approx 6\cdot\frac{0{,}7071}{0{,}9659}\approx 4{,}3924\approx 4{,}4.$

Javob: $\alpha=75°$; $\beta\approx 5{,}4$; $c\approx 4{,}4$.

UCHBURCHAKLARNI YECHISH

2-masala. *(Uchburchakni berilgan ikki tomoni va ular orasidagi burchagi bo'yicha yechish).* Agar uchburchakda $a = 6$, $b = 4$ va $\gamma = 120°$ bo'lsa, uning uchinchi tomoni va qolgan burchaklarini toping.

Yechish. 1. Kosinuslar teoremasidan foydalanib, uchburchakning uchinchi c tomonini topamiz.

$$c=\sqrt{a^2+b^2-2ab\cos\gamma}=\sqrt{36+16-2\cdot6\cdot4\cdot(-0,5)}=\sqrt{76}\approx8,7.$$

2. Endi, uchburchakning uchta tomonini bilgan holda, kosinuslar teoremasidan foydalanib, uchburchakning qolgan burchaklarini topamiz:

$$\cos\alpha=\frac{b^2+c^2-a^2}{2bc}=\frac{4^2+76-6^2}{2\cdot4\cdot\sqrt{76}}\approx0,8046.$$

$\cos\alpha\approx 0,8046$ tenglik asosida α burchakning qiymatini 153-betdagi jadvaldan aniqlaymiz (α —o'tkir burchak): $\alpha\approx36°$.

3. $\beta=180°-\alpha-\gamma\approx180°-(36°+120°)=24°$.

Javob: $c\approx8,7$; $\alpha\approx36°$, $\beta\approx24°$.

UCHBURCHAKLARNI YECHISH

3-masala. *(Uchburchakni berilgan uch tomoni bo'yicha yechish).* Agar uchburchakda $a=10$, $b=6$ va $c=13$ bo'lsa, uning burchaklarini toping.

Yechish: **1.** Uchburchak o'tmas burchakli bo'lishi yoki bo'lmasligini katta tomon qarshisidagi burchak kosinusining ishorasiga qarab aniqlaymiz:

$$\cos C=\frac{a^2+b^2-c^2}{2ab}=\frac{100+36-169}{2\cdot 10\cdot 6}=-\frac{33}{120}\approx -0{,}275<0.$$

Demak, C —o'tmas burchak ekan. Buni 153-betdagi jadvaldan C burchakning kattaligini aniqlashda hisobga olamiz. Jadvaldan kosinusi 0,275 ga teng burchak $\angle C_1=74°$ ekanligini topamiz. Unda $\cos(180°-\alpha)=-\cos\alpha$ formulaga ko'ra,

$$\angle C=180°-\angle C_1=180°-74°=106°.$$

2. Sinuslar teoremasiga ko'ra,

$\frac{a}{\sin A}=\frac{c}{\sin C}$. Bundan, $\sin A=\frac{a\cdot\sin C}{c}=\frac{10\cdot\sin 106°}{13}=\frac{10\cdot\sin 74°}{13}\approx\frac{10\cdot 0{,}9615}{13}\approx 0{,}7396.$

A —o'tkir burchak bo'lgani uchun 153-betdagi jadvaldan $\angle A\approx 47°$ ekanligini aniqlaymiz.

3. $\angle B\approx 180°-(106°+47°)=26°$. *Javob:* $\angle A\approx 47°$, $\angle B\approx 26°$, $\angle C\approx 106°$.